the OIL AND GAS JOURNAL

Arteries of Victory

Making invasion pipe on Yoder Tube Mills equipped with Timken Bearings.

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Now it can be told that one of the most potent of our "secret weapons" in downing the Nazis was the invasion pipe line.

Following the invasion forces across the English Channel; across France, Belgium and Holland; across the Rhine and into Germany itself; these pipe lines were truly "Arteries of Victory" — for they conveyed the fluids that represent the life-blood of modern mechanized armies — gas and oil.

American productive genius, represented in this instance by the Yoder Company, Cleveland, Ohio, designed and built the mills upon which the invasion pipe is made, and turned out 1200 miles of invasion pipe in its own plant. The pipe is produced by forming and welding steel strip in a continuous operation.

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PRICE 20 CENTS AUGUST 18, 1945

XUM

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HALLIBURTON OIL WELL CEMENTING CO.

DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL

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Table of Contents

NEWS DEVELOPMENTS

Operations Recently Resumed in Kuwait Following Shutdown 96
Phillips Testing World's Deepest Well 98
Oil Industry to Begin Reconversion Program Immediately .. 100
International News 102
Petroleum Industry Helped Develop Atomic Bomb 105
Texas to Reduce Production Regardless of Washington 105
Colonel Thompson Grateful for Security Imports Afford 106
Lubricant Developed for Jet-Propulsion Engines 106
Postwar Outlook Promising for Natural-Gas Industry 109
Deaths in the Industry 110

Trends 95
This Week 99
Editorial 101
Refining News 166
Natural-Gas News 169
Pipe-Line News 170

ENGINEERING AND OPERATING

Paloma Unit—An Advanced Producing Operation 112
Methods, Repair, and Operation of Magnolia Pipe Line Stations 116
Texas Cycling Operations Increase 15 Fold in 7 Years 120
Modern Rotary Drilling Machinery and Practices—Part 7 ... 128
Oxidation of Paraffins 145
Oil and Gas Equipment Digest 161

Questions on Technology .. 143
Books 153
The Refiner's Notebook .. 155
Eng. Fundamentals 157

EXPLORATION AND DRILLING

Week's Highlights 173
Weekly Well-Completion Record 173
Daily Average Production for Week 174
Reports by Areas Start on Page 174

ADDITIONAL FEATURES

Drilling Contractors 184
Personals 186
Market Summary 187
Classified Advertising 189
Calendar of Events 192
Index of Advertisers 192

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the OIL AND GAS JOURNAL

Trends

Crude-Oil Production By States—Page 174

CRUDE-OIL STOCKS 215,382,000 bbl. as of August 4—down 3,125,000 bbl. One year ago 222,931,000 bbl.

GASOLINE STOCKS 84,812,000 bbl. as of August 4—down 1,196,000 bbl. One year ago 79,410,000 bbl.

RESIDUAL FUEL-OIL STOCKS 42,842,000 bbl. as of August 4—up 559,000 bbl. One year ago 56,885,000 bbl.

GAS OIL AND DISTILLATE STOCKS 36,721,000 bbl. as of August 4—up 650,000 bbl. One year ago 38,951,000 bbl.

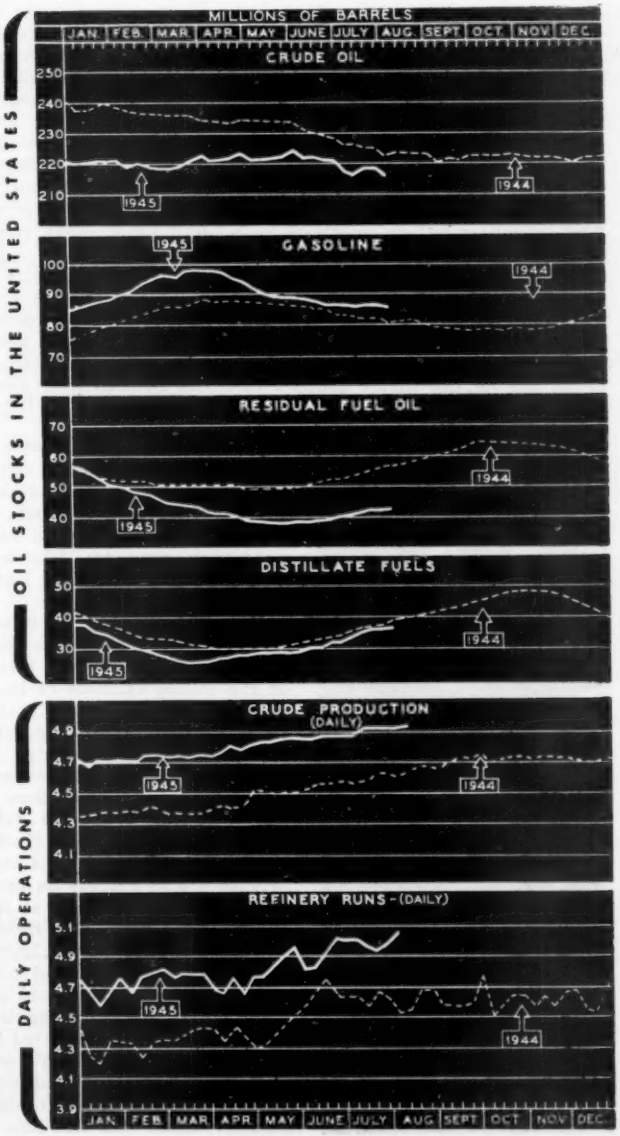
CRUDE-OIL PRODUCTION 4,933,600 bbl. as of August 11—up 14,000 bbl. One year ago 4,656,100 bbl.

REFINERY RUNS 5,077,000 bbl. daily week ended August 4—up 81,000 bbl. One year ago 4,522,000 bbl.

RESTORATION of crude-oil and product inventories to adequate working levels is one of the first conversion jobs confronting the petroleum industry. Heavy drafts on crude-oil stocks have lowered above-ground supplies to the lowest point since 1921. There is full realization that storage is considerably below comfortable working levels. Peacetime conditions permit the greater flexibility in operations to which the industry had become accustomed. Adequate working stocks are essential to economic operation. The industry will move promptly to restore normal relationships between the rate of operation and inventories of its commodities.

THE need for larger stocks of crude oil will modify the margin of reduced production which would otherwise follow curtailment of military requirements. In fact, most of the curtailment in producing operations will be concentrated in Texas and California where numerous fields have been exceeding maximum efficient rates to meet wartime demand. Producing operations, it is anticipated by the industry's economists, will not be changed substantially in the Middle West, the eastern area and in the Rocky Mountains by cessation of hostilities. Conversion to peacetime producing levels will be a gradual process. The West Coast demand will not recede materially until occupation of Japan is completed and the Pacific forces are returned to this country.

INCREASED domestic consumption resulting from removal of rationing restrictions and continued need for abnormal military supplies will modify declines in production. This means that the industry must continue its development and exploration programs substantially unchanged from previous projections. With materials again available, the industry is expected to drill hundreds of fill-in locations which could not be developed under restrictions of PAO 11. Abolishment of spacing limitations should stimulate development drilling substantially in the shallow producing areas although many of them have been operated under PAO 11 supplements for several months. Drilling should also increase in many "restricted areas" consisting chiefly of gas-condensate pools which operators will fit into commercial services since war supplies are no longer the primary consideration either in products or in application of equipment.



XUM

No. 1

MIDDLE EAST REPORT *from the* EDITOR

Operations Recently Resumed In Kuwait Following Total Shutdown Caused by War

by C. O. Willson

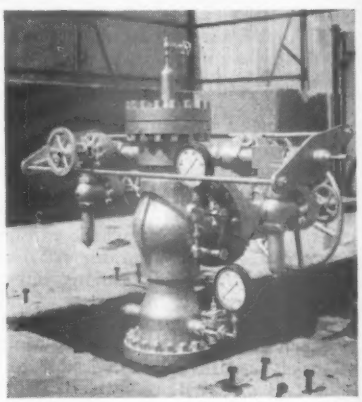
KUWAIT, Persian Gulf—"We are always glad to have you Americans visit us. We want you to come often and get acquainted with our customs, our religion, and our ways of carrying on business. Our friends, the British, we have known for a long time, and we hope to know you as well."

This friendly greeting was extended to the writer in an early morning interview with His Highness, Sir Ahmad al Jabir al Saban, ruler of Kuwait which became a part of the petroleum world a short time before the start of the war with the completion of a successful wildcat. The interview left no questions unanswered as to the friendly feeling of one of the most interesting of the Arab rulers toward the representatives of the English speaking peoples who are in charge of an oil operation which will probably become one of the major sources of supply in the Eastern Hemisphere. Operations were recently resumed on the concession which includes all of Kuwait following a shutdown in 1942 brought about by the threat of enemy action in this area.

The Shaikh is anxious that his country become one of the oil-producing areas of the Persian Gulf as quickly as possible. He keeps in close touch with developments from week to week, and frequently talks with the management of the Kuwait Oil Co., Ltd., owners of the concession. He is hopeful that oil shipments will start from the shores of his country within a few months and every effort is being made to accomplish that objective by the management.

The sheikdom of Kuwait is an independent country in which the culture, religion and economic practices of the Arab race are controlling in governmental and social policies. The British have treaty rights with Kuwait and a political agent of the British-Indian Government is located here.

Kuwait consists of 6,000 sq. miles being approximately equal in size to the State of Connecticut. The entire country is desert area. Most of the population lives in this historic seaport of the Persian Gulf. Nomadic tribes carry on grazing activities in the surrounding desert. Kuwait is an active seaport city of approximately 80,000 people with the building of sailing craft, fishing, and a pearl industry, the principal enterprises of the inhabitants. The city is also a trading center for the upper part of the Persian Gulf area. The water supply is not suitable for domestic use and is partially imported by sail boats and a large part of the food supply is also imported.



Completed well in the Burgan field

This is the first of several articles on Middle East petroleum operations by the Journal's editor who is making an on-the-ground investigation and fact-gathering trip to the Mediterranean and Persian Gulf producing countries. His personal inspection tour of the Middle East oil countries started in mid-June.

In traveling many thousands of miles, he has visited Saudi Arabia, Egypt, Iran and Bahrein Island. He has interviewed many of the ruling officials of the oil-producing countries visited so far and has accumulated invaluable background on the political and economic affairs of the Middle East countries. His knowledge of operations, gained by inspection and from key operating men, will be reflected in the Journal's reports of his findings both during the trip and after it is concluded. Other articles are in process on operations of the world's largest refinery at Abadan and on the fabulous producing fields of Iran.

Willson writes particularly enthusiastically about the scope and tempo of operations in Saudi Arabia and on Bahrein Island, where he was stopping when most recent dispatches were filed to the Journal.

Before returning to this country he will visit Iraq producing and pipe-line operations, refineries on the eastern end of the Mediterranean and London.

History of Oil

Interest in the oil possibilities of this country date back to the late twenties. A concession covering the entire country was granted to the Kuwait Oil Co., Ltd., December 23, 1934. The company is jointly owned and managed by the Anglo-Iranian Oil Co., Ltd., and the Gulf Exploration Co. (Gulf Oil Corp.).

Geological work of the Kuwait Oil Co. started in 1935 and geophysical work began in 1936. The first test at Bahrah, north of Kuwait Bay, became a dry hole at a depth of

8,000 ft. The rig was then moved about 30 miles south of Kuwait to test a structure located at that point.

This test was started in October 1937 and it was completed as a flowing well at a depth of 3,692 ft. in February 1938. This first well penetrated the Upper Cretaceous oil-bearing sands only a few feet and started flowing. The crude oil was 32.5 gravity (A.P.I.) and of mixed base.

The successful completion of this wildcat test brought about a development program which extended through to 1942. During this period eight additional wells were completed as producers with no dry holes in an area which is approximately 5 miles square. No extensive testing of the producing possibilities of any of the wells has been possible. All the usual mechanical tests have been made, however, with the results all pointing to large sustained production.

The average depth of the wells other than No. 1 is approximately 4,750 ft. A producing sand column of more than 1,000 ft. broken with shale formations is indicated in the development so far. The closed-in well pressure is approximately 650 lb.

KUWAIT CRUDE-OIL EXAMINATION

Description:

Sample number—BG-2
Crude—Kuwait
Shipped from—Kuwait via S.S. Bankura
Well No.—Burgan No. 2

Inspection:

Gravity, °A.P.I.	33.0
Vis. at 100° F.	49.8
Flash, OC, °F.	Below 60
Pour, °F.	—10
Color	Greenish brown
Sulfur, B, per cent	2.06
Water and sed., per cent	0.10

Yield summary:

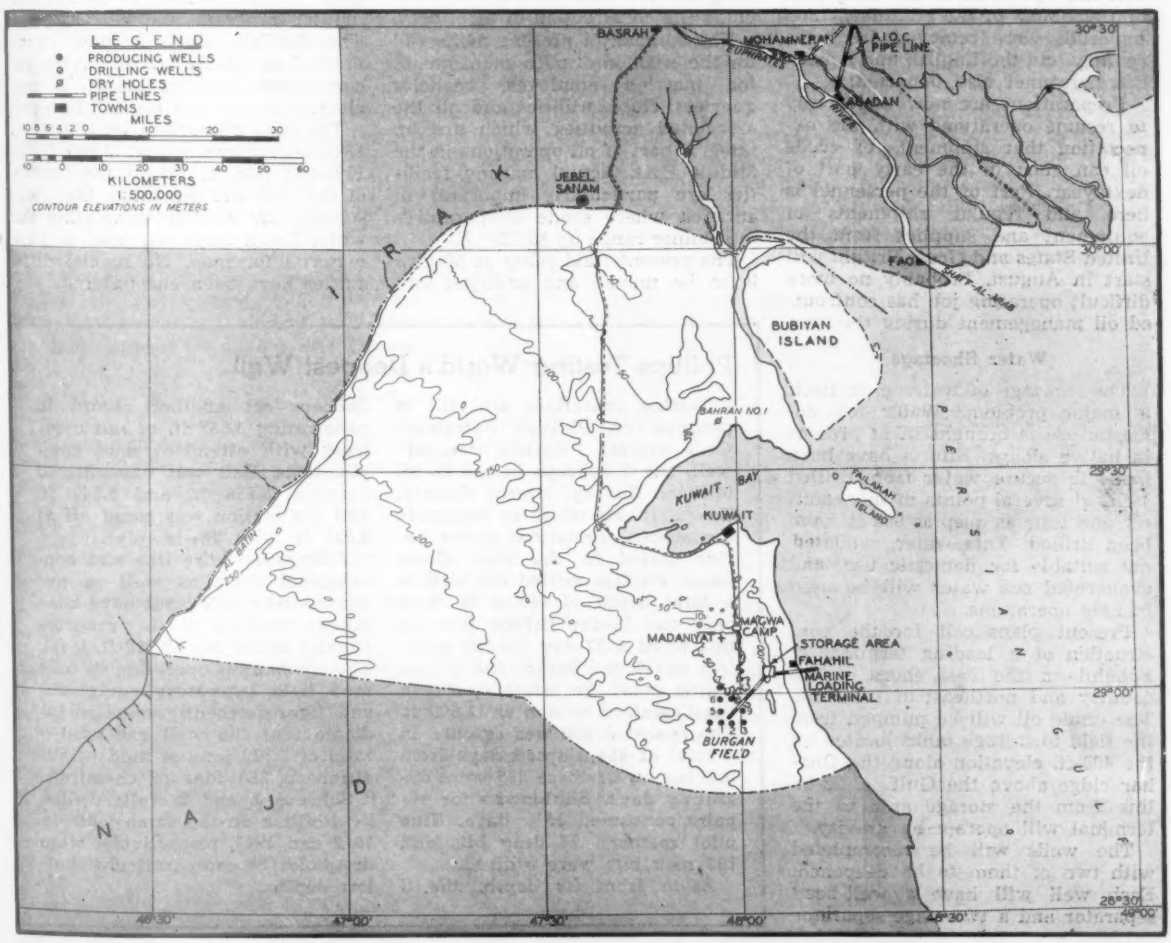
		Per cent
Motor gas. dist.	over 392° F.	28.6
Gravity, °A.P.I.	62.5	
Sulfur, L, per cent	0.05	
Octane No., C.F.R.	46	
Heavy blend dist.	392°-428° F.	3.8
Gravity, °A.P.I.	46.5	
Heavy kerosene dist.	428°-518° F.	10.0
Sulfur, L, per cent	0.40	
Gravity, °A.P.I.	42.0	
Bottoms		56.8
Gravity, °A.P.I.	19.6	
Vis. at 100° F.	773	
Pour, °F.	+55	
Sulfur, B, per cent	3.19	
Carbon residue, per cent	6.37	
Loss		0.8
		100.0

Bottoms:

Acid treatment, 5% by vol., 98% acid	
Loss to sludge, per cent	36.0
Gravity, °A.P.I.	23.7
Vis. at 100° F.	274
Pour, °F.	+55
Color (3:1 dilution)	dark

Assay distillations:

	Crude	Motor gas. dist.	Heavy kero. dist.
Gravity	33.0	62.5	42.0
Over point	110	98	424
End point	...	427	577
Per cent at 221° F.	...	28	...
Per cent at 284° F.	...	57	...
Per cent at 392° F.	...	95	...
10 per cent at °F.	...	168	446
50 per cent at °F.	...	269	473
90 per cent at °F.	...	363	527
°F.	Per cent		
122	0	...	...
140	1	...	...
158	2	...	...
176	3	...	...
194	4	...	...
212	6	...	...
230	8	...	...
248	10	...	...
266	12	...	...
284	14	...	...
302	16	...	...
320	19	...	...
338	21	...	...
356	23	...	...
374	26	...	...
392	28	...	...
410	30	...	...
428	32	...	0
446	34	...	10
464	36	...	37
482	38	...	60
500	40	...	76
518	42	...	87
536	44	...	93
554	46	...	95
572	48	...	97
590	50	...	...
Recovery	50	98	98
Residue	49	1	1
Loss	1	1	1



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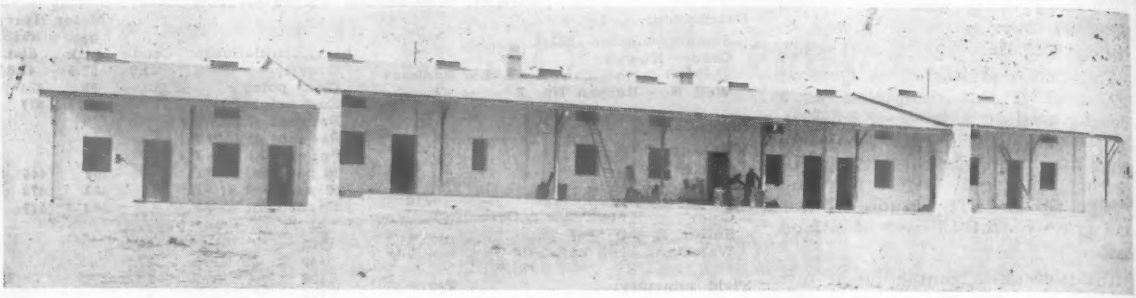


Bachelors' quarters at Magwa

A tenth test of another structure several miles north of the present field was being drilled when operations were shutdown in 1942. Drilling of this test will be resumed as soon as possible.

This country was visited last fall by the Technical Oil Mission to the Middle East sponsored by Petroleum Administrator Ickes and headed by E. DeGolyer. On a basis of the well information and extensive geological-geophysical studies that were available, E. DeGolyer estimated the country's proved and indicated reserves to be 9 billion barrels.

As a war-protection measure it was necessary to practically abandon this operation in the early part of 1942. Most of the equipment and materials were removed from the country and the English and American personnel also departed.

Preparations are now under way to resume operations with the expectation that shipments of crude oil can start in the early part of next year. Part of the personnel is here and regular shipments of equipment and supplies from the United States and Great Britain will start in August. Probably no more difficult operating job has confronted oil management during the war.

Water Shortage

The shortage of water is in itself a major problem. Water for domestic use is brought in at present in native sloops. Efforts have been made to secure water from drilled wells at several points in this country and tests as deep as 960 ft. have been drilled. This water, which is not suitable for domestic use, and evaporated sea water will be used in field operations.

Present plans call for the construction of a loading terminal at Fahahil on the east shore of the country and northeast of the field. The crude oil will be pumped from the field to storage tanks located on the 400-ft. elevation along the Dhahar ridge above the Gulf. A 22-in. line from the storage area to the terminal will operate by gravity.

The wells will be recompleted with two of them to be deepened. Each well will have a well-head separator and a two-stage separator will be operated near the storage facilities in the final stabilization of the crude oil. It is anticipated that dual completions will be a part of future operations.

This operating program has been approved by the Allied war control boards as necessary in connection with the plans for the war in the Pacific and the rehabilitation work in Europe. The required equipment and materials have been approved by the Petroleum Administration for War. The crude oil, when available, will be disposed of where it will most effectively serve the war program. It is assumed that in the postwar period the development program for this country will include the construction of a refinery.

The company's present plans call for the erection of permanent homes for married employes, bachelor quarters, clubs, utilities and all the associated activities which are an integral part of oil operations in the Middle East. Actual housing facilities are particularly important in an area where shade temperatures in summer range up to 120° F.

The present field camp at Magwa is to be moved and enlarged and centrally located in relation to field and terminal activities. The company headquarters and docking facilities are now located at Kuwait.

The oil operation has weekly airplane service from Abadan, Iran supplied by the Anglo-Iranian Oil Co., Ltd. In addition to water transportation the company obtains supplies from Basra in southern Iraq to which it is connected by a 50-mile desert highway.

Drilling

The drilling equipment has been adapted to the equipment available in this area. Over a period of years it is anticipated that due to the type of formation, a substantial drilling program will be necessary. The derrick which is now being erected at the first well for the recompletion work is 136 ft. A mechanically powered rig will be used.

The casing program is: 250 ft. of 18⅝-in. surface casing; 3,600 ft. of 11¾-in.; 8-in. is set to the bottom of the well and cemented. Electrical surveys are used in completing the wells. Local clays are used as base material for mud. No special difficulties have been encountered.

Phillips Testing World's Deepest Well

Testing operations are still in progress on Phillips Petroleum Co.'s newest "world's deepest" well, the 3 Schoeps in the E. M. Millican Survey, Brazos County, Texas. In an effort to penetrate Cretaceous formations never before tested in the Gulf Coast basin, Phillips drilled the well to a total depth of 16,655 ft. with only one ½-day fishing job. At this point a 57-day fishing problem developed before the 5½-in. casing could be set, May 20, in the Eagleford section at 12,000 ft. The record depth was reached in a total of 354 elapsed days from moving in. Of these 315 were operating days. Shutdowns for repairs consumed 15½ days. Nine pilot reamers, 27 drag bits and 133 rock bits were utilized.

Aside from its depth, the 3 Schoeps set another record in penetrating 3,687 ft. of salt overhang with attendant mud complications. Salt was encountered between 5,656 ft. and 9,343 ft. and the section was cased off at 9,531 ft. with 9⅝-in. pipe.

Fifty-seven wire line and conventional cores as well as numerous side well cores have been taken. Testing is in progress slightly below the 12,060-ft. level. The company is operating its own mud field laboratory equipment and figures recently released indicate that the well has used a total of 3,122 tons of mud in addition to 253 tons of chemicals.

Schoeps 1 and 2 wells drilled by Phillips on the same lease in 1942 and 1943, respectively, were dry holes of comparatively shallow depths.

THIS WEEK

RECOVERING— Bombed-out refinery near Hannover rebuilt and on stream. . . . One of Germany's largest. . . . ¶PAW doubles volume premium gasoline available for civilians. . . . Total quantity for civilian use unchanged. . . . ¶Socony-Vacuum says it can convert its 10 major refineries to civilian gasoline production within 12 hours after V-J Day. . . . ¶President speeds reconversion plans on return from Potsdam. . . . Indications point to WPB as government agency to handle reconversion policies. . . . ¶Chairman Krug, of WPB, outlines five points for "orderly transition from war production." . . . ¶Tariff Commission predicts postwar prices for crude and products higher than 1939 base. . . . ¶Reconversion aid in procurement of materials valued at $150,000,000 granted passenger automobile producers. . . .

LEGISLATION— Tax legislation affecting motor fuel enacted by 26 states. . . . Four measures involve rate increases. . . . ¶Bill in Congress would require Government to return to states mineral rights acquired by purchase, concession, or condemnation. . . . ¶Crude-price squabble still undecided as Patman committee on small business in House prepares further report. . . . ¶OPA continues tabulation of crude-cost questionnaires. . . .

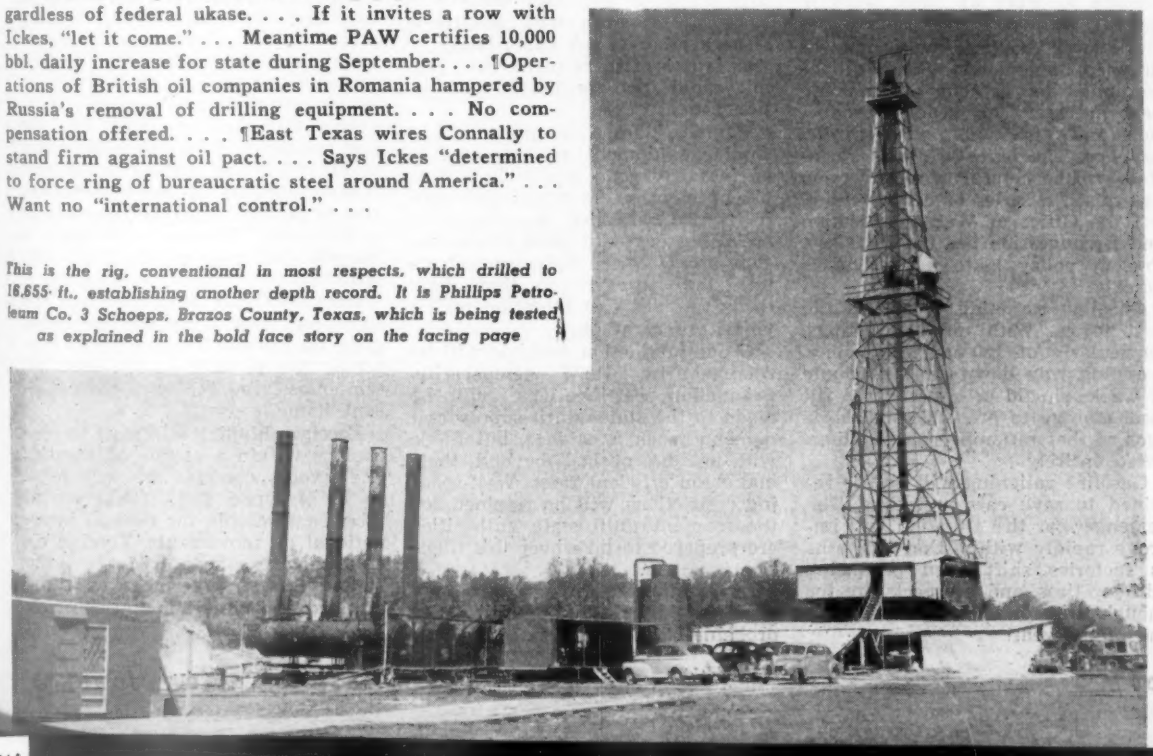
RESEARCH— Revolutionary P-80 Shooting Star flies "closer to speed of sound than man ever traveled." . . . Burns kerosene and promises 1,000 miles per hour. . . . "Cross Atlantic in a morning." . . . Availability for private or commercial use unlikely "for long time." . . . ¶PIWC accepts mammoth job of studying German oil formulas with view of producing better gasoline. . . . ¶New "supergasoline" in production at undisclosed number of refineries, PAW reveals. . . . Best performance obtained with engines specially designed for the fuel. . . .

RESTIVE— Railroad Commissioner Jester says Texas will reduce oil production following Jap surrender, regardless of federal ukase. . . . If it invites a row with Ickes, "let it come." . . . Meantime PAW certifies 10,000 bbl. daily increase for state during September. . . . ¶Operations of British oil companies in Romania hampered by Russia's removal of drilling equipment. . . . No compensation offered. . . . ¶East Texas wires Connally to stand firm against oil pact. . . . Says Ickes "determined to force ring of bureaucratic steel around America." . . . Want no "international control." . . .

PRODUCTION— Nation's output up 14,000 bbl. daily from previous week to total of 4,933,600. . . . Changes minor, except Kansas, which rose 10,700. . . . West Edmond still rising, with daily average of 83,050 bbl. from 617 wells. . . . ¶Completions 578, down 11. . . . ¶Navy begins first test well northern Alaska. . . . Had reserve staked 20 years. . . . If strikes oil won't develop field, but hold for emergency. . . . ¶Bureau of Mines estimates country's average crude demand for August at 4,939,500 bbl. daily. . . . Compares with actual August demand in 1944 of 4,683,000. . . . ¶Still testing Phillips' "world's deepest" well, Brazos County, Texas. . . . Reached 16,655 ft. . . .

SCARCE —PAW limits large-scale consumers of fuel oil on East Coast to 30 days' supply. . . . Avoid shortage next winter and meet Navy's needs. . . . World-wide shortage presents petroleum's acutest problem. . . . ¶WPB denies request for 42,000 tons steel for drums, owing to critically short supply of sheet steel. . . . ¶Demand for laboratory equipment far beyond capacity of industry, joint Army, Navy, and WPB committee reports. . . . ¶WPB imposes fresh restrictions on uses and stocks of tin. . . . Shortage to continue for year after war. . . .

CONSTRUCTION—Pure plans $1,000,000 coke plant near Toledo. . . . Standby unit for use when more advantageous to make coke than fuel oil. . . . ¶Great Lakes' $6,000,000 expansion program, held up by PAW, expected to open as soon as pipe is available. . . . Involves 800 miles of 8-in. line. . . . ¶Chinese Government plans 1,000-mile pipe line from Kansu Province to point 500 miles north of Chungking. . . . Part of program for development Yumen district oil resources. . . . ¶Gasoline and other products to be made from natural gas in Carthage field by Hydrocarbon Research, Inc. . . . Refinery on lines of Standard Oil's Baton Rouge pilot plant.



This is the rig, conventional in most respects, which drilled to 16,655 ft., establishing another depth record. It is Phillips Petroleum Co. 3 Schoeps, Brazos County, Texas, which is being tested as explained in the bold face story on the facing page

Oil Industry to Begin Program Of Reconversion Immediately

by Henry D. Ralph

WASHINGTON.—Rapid reconversion toward more normal methods of operating is scheduled to start in the oil industry immediately after official announcement of the end of hostilities with Japan.

While Washington waited the decision that would stop fighting in the Pacific the Petroleum Administration for War and all other Government agencies were working feverishly on plans for dropping controls, rescinding orders and regulations, and liquidating the war business as rapidly as consistent with orderly procedure.

There will be a period of confusion, for the Japanese surrender offer caught all Washington unprepared for peace, but the last few days have been utilized to improvise policies and programs, many of which will have to be amended and implemented later.

PAW intends to adhere to its promise to be one of the first wartime agencies to fold up. It will be down to a mere skeleton in 90 days and off the books by Christmas, with some other agency handling whatever liquidation remains to be done. But there will be no wholesale exodus of industry men from PAW. Deputy Administrator Davies is insisting that key officials remain long enough to wind up their work in orderly fashion.

All war controls will not be dropped immediately. Some will be continued for as long as they appear necessary for orderly production and distribution of essential supplies. The extent to which controls will be helpful to reconversion has raised a series of controversies, but the Office of War Mobilization and Reconversion has the final say. Present policy is to drop controls quickly.

Gasoline rationing is among the first to go. With military liftings, particularly of 100-octane gasoline, dropping way down, only a couple of weeks should be sufficient to fill local storage to prevent spot shortages so that rationing can be eliminated entirely.

Gasoline rationing will not be retained to save cars and tires. The passenger-car tire situation will improve rapidly within 2 or 3 months as factories shift from producing military tires, and prospects are for enough tires for all motorists by the end of the year.

The military still will purchase large quantities of petroleum products, But this will not put a heavy strain on the oil industry nor require curtailment of civilian consumption. Reduction in 100-octane use and cancellation of contracts for toluene for explosives will free base stock and refining capacity for motor gasoline and will permit upgrading of octane rating of civilian grades.

Fuel oil will still be needed in large quantities for ship use and this product will remain tight for some time but with steady improvement. By cold weather, supplies of heating oils are expected to be ample to meet all demands, and because of the prospect of a continued coal shortage there may be considerable reconversion of heating plants to oil fuel. Residual fuel oil may be rather scarce.

Materials to Ease

Oil-industry materials will start easing up immediately. Cancellation of orders for bombs and rockets will free steel and mill space for production of ample quantities of tubular goods, though it will take weeks to fill up inventories. Manufacturers of tool joints, drilling bits, and similar equipment still have large backlogs which it will take some time to work off even with additional steel available, but cancellation of war orders of these plants will permit rapid increase in the production rate.

Engines, pumps, compressors, and similar equipment are expected to be in fairly good supply in a couple of months. As major war contracts are cancelled manufacturers are being urged to place immediate stop orders with their subcontractors and suppliers so that these firms can put full attention on civilian orders at once.

Crude-production controls will be retained by PAW temporarily. Production certifications will be made to the states until supply and demand reach a balance, but fields will not be pushed beyond their maximum efficient rates. Well-spacing restrictions will be retained for the moment until state authorities are prepared to take over this function.

Distribution controls will be relaxed rapidly but not until it is probable there will be no local shortages. First to go will be requirements to divert crude to refineries making petroleum war products. Pooling of products and unloading facilities in the East will be retained until inventories are built up.

Price control will be retained longest of all, to prevent postwar inflation, but policy is to remove controls from any commodity as soon as supply and demand approach a balance. On oil this may come fairly soon. Subsidies granted in lieu of price increases will remain as long as price controls, including the crude-oil stripper-well subsidy. Oil-transportation subsidies will continue only so long as there is demonstrated need to make abnormal rail shipments. More tankers will be available to supply the East Coast almost immediately, and the Government-owned big-inch pipe lines will continue to move crude and products into District 1 so that long tank-car movements can be discontinued shortly. Restrictions on tank-car and tank-truck movements are expected to be lifted promptly.

The manpower situation will ease rapidly but will be spotty. The draft is scheduled to continue but Congress will soon stop it if the President doesn't, and meanwhile deferments for key men will be easier. It will take some time for the oil industry to get back the skilled workers and technicians lost to the military and other industries. Government controls on hiring are being dropped, but wage and salary controls will continue perhaps through the winter to prevent inflation and foster orderly readjustment.

War Production Board is dropping most priority controls and freeing materials for civilian use without restriction. Some priority ratings will be continued temporarily to assure completion of essential programs. Some commodities, like tin and lumber, will be scarce for many months, but the outlook is for sufficient supplies of most commodities to permit rapid reconversion to a peacetime industry, including a considerable amount of new construction.

Domestic rail shipping will be tight for some time but will ease after the normal late fall peak. Passenger travel will be difficult all winter as large bodies of troops are sent home.

Foreign shipping will start to ease rapidly within a couple of months, and export controls are scheduled to be dropped fast. Tankers will soon be available for normal international oil movements. Foreign oil developments sponsored by the United States Government will be dropped, but materials and shipping

(Continued on page 105)

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Conversion Problems

THE soundest judgment yet exacted from leaders of the petroleum industry is demanded in converting to peacetime. The industry must be exceedingly careful to avoid the pitfalls of peace hysteria. There should not be an abrupt termination of all wartime controls. Conditions call for immediate abolishment of certain regulations as soon as the surrender is formally ratified. Other controls must be relaxed more gradually.

Liquidation of the Petroleum Administration for War should be spread over 3 to 4 months, depending upon general economic and business factors beyond control of the oil industry. The first impulse to throw off all governmental restraints should be firmly suppressed. Serious unbalances might result from sudden removal of all central authority. Stocks, for example, are in delicate balance in some districts. Maladjustments which would follow abandonment of equalizing forces would be inimical to the industry and to its consumers.

There is no simple way of converting to peace. Neither was it easy to gear the industry's operations to exigencies of war. Most oil men remember vividly prewar boasts that the industry needed no outside assistance in meeting war demands. This ill-considered pronouncement was accepted at its face. The results are familiar to all. During the first 2 years of war the industry received barely enough consideration to subsist from those in charge of steel supplies. There need be no fear that conversion problems will take exactly the same form as those balking the industry in 1942 and 1943, but they could be just as troublesome.

PAW influence in channeling supplies of crude oil is a case in point. Members of the Texas Railroad Commission have already declared their intention to cut production. Southwest and Middle West refiners, too, will reduce their rates of operation. But with the supply of crude decreased, there is every reason to believe that it would go chiefly to refiners in position to store the excess over immediate requirements.

Operators who have maintained their plants at full productive capacity in serving the war demand are entitled to a period of grace in the conversion process. It would be unfortunate for all concerned if the small-plant operator, dependent on outside assistance for his crude supply, were to be cut adrift without warning. His war service has warranted better treatment, and it is up to the industry and PAW to cushion the change as much as possible.

There is no thought that the industry should permanently protect uneconomic operations by any element in the business. Each operator, however, from the largest to the smallest, should have a reasonable opportunity to adjust his facilities and business to peacetime service. Until such time as competitive forces exert normal impact within the industry guidance of PAW should be retained. A conversion period of 90 to 120 days would be short indeed in terms of the war and in the longer-range peacetime era. Permanent blights on the industry's record might result from abandonment of regulations which are needed to bridge the gap between war and peace.

No one is more anxious to abolish centralized control than we. Timing is the only issue. Responsible leaders in the industry deserve support in their belief that PAW is essential in bringing about orderly conversion.

XUM

INTERNATIONAL

Italian Refineries Are Being Returned to Service

Although complete details are lacking as to the condition of Italian oil-refining installations, preliminary reports indicate that damage was severe to many of the plants in northern Italy. As formerly reported, the Azienda Nazionale Idrogenazione Combustibili plant at Bari is being restored. Facilities of the same company operating at Leghorn were badly damaged, as was a plant at Naples owned by a subsidiary of Socony-Vacuum Oil Co., Inc.

Plants at Spezia, Fiume, Trieste, and Porto Marghera are said to have received considerable damage. At Porto Marghera is located a refinery with a 10,000-bbl. daily throughput, which is said to be the largest in the country.

Curacao Refinery to Lift Aviation Fuel Yield

Production of 100-octane aviation gasoline from the Curacaoasche Petroleum Industrie Mij. refinery at Curacao, Netherlands West Indies, will be increased to about 18,000 bbl. daily by the end of 1945. Current production of 100-octane fuel by the Curacao plant was reported to be 13,000 bbl. per day.

"Moreover," according to the annual report of the Royal Dutch Company, "aviation gasoline components are being manufactured in appreciable quantities and made available to other producers in the Caribbean area and in the United Kingdom."

Geophysical Parties Active in Cuban Areas

Despite the fact that no important source of petroleum has been established in Cuba, oil companies are continuing both geophysical surveys and exploratory drilling at several points in the republic. Of the three field parties working for one United States company, one is located offshore around the western end of the island, with its base at Santa Fe; a second is in south-central Pinar del Rio Province, and the third is in the Cauto Valley in the Oriente Province.

This company finished and abandoned a third test hole at a depth of 3,441 ft. in south-central Pinar del Rio in May 1945, because it was bottomed in serpentine instead of the favorable sedimentary formation as were the two holes previously drilled. Preparations are under way to start drilling a fourth hole about 4 kilometers west of Los Palacios in the same province.

British-Dutch interests, operating in northwestern Camaguey Province, reportedly are drilling a test hole near Punta Alegre, where a depth of 911 ft. has been reached.

Present production of petroleum products in Cuba is confined to naphtha at Motembo, where average monthly output for the first 3 months in 1945 was less than 250,000 gal.; light-gravity oil at Jarahueca, with output during the first quarter of the current year at less than 50,000 gal. monthly; and asphalt from small mines in Pinar del Rio and Santa Clara.

Removal of Tools Impedes Oil Work in Romania

LONDON.—Operations of British oil companies in Romania are impeded by removal of drilling tools and materials by Russians, who are said to offer no compensation, according to a report of Phoenix Oil & Transport Co. The report said that Russian demands for reparations and domestic requirements preclude exports at present, although the properties have been recovered and contacts reestablished between Romania and London.

Loudon Made President of Caribbean Petroleum Co.

NEW YORK.—J. H. Loudon last week was elected president of the Caribbean Petroleum Co., an associate within the Royal-Dutch Shell group and one of the larger oil-producing companies in Venezuela. At the same time, the election of H. Wilkinson as chairman of the board was announced by the directors of the company. Both of these officials have had long experience with the Royal-Dutch Shell interests, both here and abroad.

Loudon joined the Royal-Dutch Shell at the Hague in 1930, following his graduation from the University of Utrecht as a Doctor of Laws. After short service in The Hague, he spent 5 years in the United States, first with the Shell Oil Co. in the east and then with the Shell Oil Co. of California. In 1936, he went to Venezuela as assistant manager of the Caribbean Petroleum Co., serving under B. Th. W. van Hasselt. In August 1944, van Hasselt was elected a managing director of the Royal-Dutch Shell group, with headquarters in London, and Loudon replaced van Hasselt at that time as general manager of the Caribbean Petroleum Co. Now, as its president, he will continue to maintain his headquarters in Caracas.

Wilkinson, who has recently been released from his war duties in Washington as the British Government's petroleum representative in the United States, returns to the Caribbean company as a director and chairman of the board. Born in Burma, Wilkinson joined the Royal-Dutch Shell in 1922; after various short periods of service in London, the Straits Settlements, Malaya and again London, he was assigned to South Africa where, in 1930, he was appointed manager of Shell interests there. His experience in the United States began with his election in 1932 to the vice presidency of Asiatic Petroleum Corp.; in 1936, he was elected president of Asiatic and of the Caribbean company. Following Pearl Harbor and the entrance of the United States into the war, Wilkinson served in Washington as British petroleum representative, until June of this year. During his absence, F. J. Hopwood, who has now returned to London, served as president of Caribbean and Asiatic. Wilkinson now returns to Shell service and will be located in New City.

Socony Affiliates Testing Six Wells

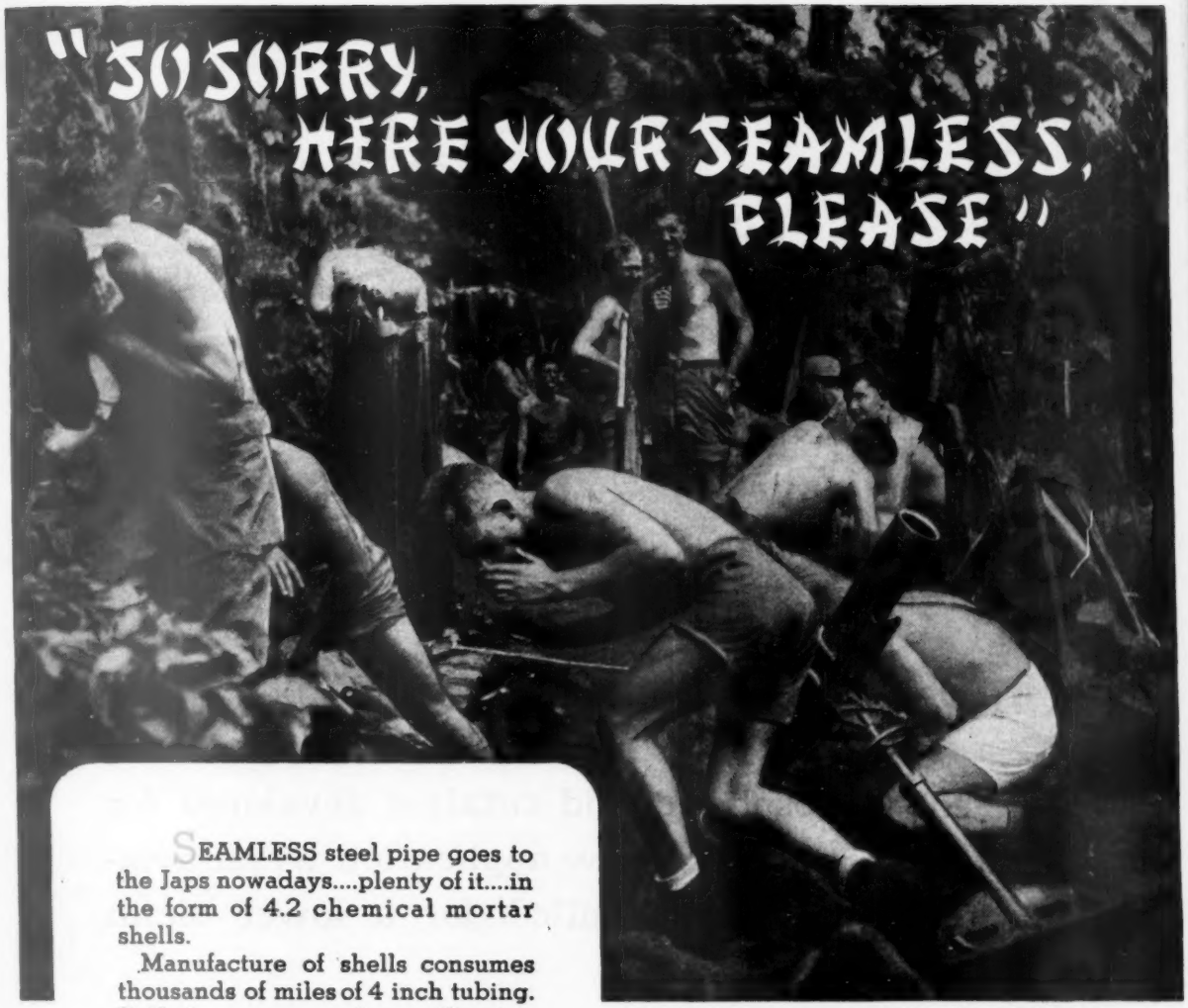
Foreign affiliated companies of Socony-Vacuum Oil Co., Inc., are testing or in process of completing six development wells in Venezuela and Colombia, leaving nine other operations in those countries at various stages of drilling. Three of the wells nearing completion are in the Guico Concession, Oficina area, of eastern Venezuela. Another is in Venezuela's San Joaquin district. Two Colombian wells, 6 Catagallo in the Magdalena Valley, and 19 Socuavo, in the Barco Concession, are also being tested.

Mexican Geologist Holds North Prospects Good

Rich oil deposits abound along Mexico's northern frontier, the Gulf Coast and a zone extending from the Rio Grande to the Isthmus of Tehuantepec, Ezequiel Ordonez, Mexican geologist, declared last week at Mexico City.

Ordonez, a veteran oil prospector, collaborated with the first United States and British oilmen who came to Mexico. He praised their work, explaining they did not lose heart despite initial failures and enormous expenses.

Ordonez declared that to discover important new oil deposits in Mexico will require much perseverance and many millions of dollars.



American troops attacking a Japanese position with a 4.2 mortar, somewhere in the Pacific area. Official U. S. Army Signal Corps photograph.

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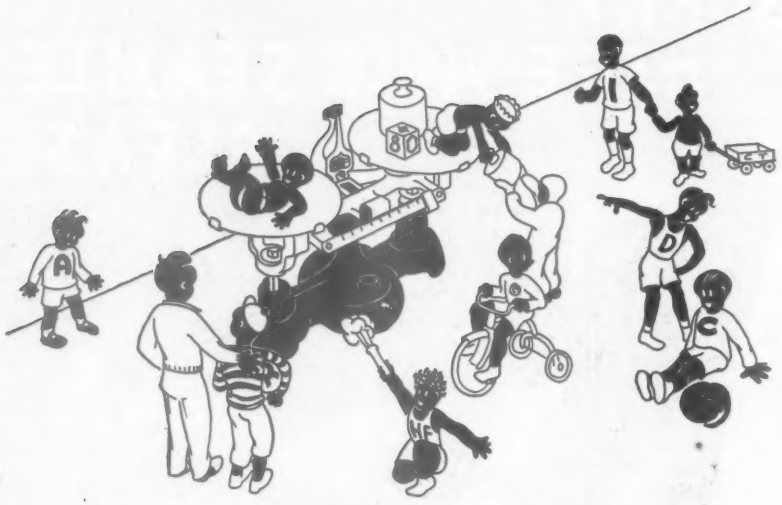

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Petroleum Industry Helped To Develop Atomic Bomb

CHICAGO.—Standard Oil Co. of Indiana and M. W. Kellogg Co. are among concerns in the petroleum and allied industries which gave substantial help in developing the atomic bomb.

Indiana Standard has been carrying on a secret project in an isolated section of its Whiting refinery related to the bomb project. It has been in progress since the latter part of 1943 and is continuing.

The company last week made public a congratulatory telegram from Robert P. Patterson, undersecretary of war, acknowledging the company's part in the bomb's development and praising its work.

The company also disclosed that G. W. Watts, director of engineering in the manufacturing department, had been on loan for about 2 years to Kellex Corp., a Kellogg subsidiary which designed one of the bomb plants. Other Standard employes also were loaned for work on the bomb and some are still on leave for this purpose.

Kellex designed one of the major atomic-bomb plants at Oak Ridge, Tenn. The company was formed for the purpose and worked for 2½ years in secrecy.

Quaker State Acquires Bolivar Refining

BRADFORD, Pa.—Quaker State Oil & Refining Co. has acquired control of Bolivar Refining Co., Bolivar, N. Y., by purchase of 91 per cent of the latter company's stock. The consideration is reported to have been approximately $700,000.

The Bolivar refinery was established in 1934 with a capital of $500,000. Operations will continue without interruption. The refinery has about 85 miles of field gathering lines which deliver about 1,050 bbl. of oil a day.

Purchase of the Bolivar company stock gives Quaker State its first refinery in New York. It now owns three in Pennsylvania and one in West Virginia.

Greed Blamed for Delay in Texas-to-California Line

AUSTIN.—"Monopolistic greed" is blocking efforts to build an oil pipe line from Texas to California, Olin Culberson, chairman of the Texas Railroad Commission, declared here last week.

"Those in authority in such matters in Washington, many of whom are dollar-a-year men on leave from the organizations they represent, invariably rule against extending any consideration to those rugged individuals and groups who seek to make their contribution toward winning the war by proposing to enter the competitive field of business controlled by monopolistic groups," says Culberson in a written statement.

"Never in my experience have I ever witnessed the brazen effrontery of monopolistic greed as has been the case in connection with the efforts to build a pipe line to the Pacific Coast for the purpose of supplying urgently needed crude oil for the Pacific war effort.

"This does not only obtain in connection with the attempt by an independent group to build a pipe line to California, but is present in practically all other lines of activity wherein the interests of large entrenched groups are concerned."

Texas to Reduce Production Regardless of Washington

AUSTIN.—Beauford H. Jester, of the Texas Railroad Commission, said Texas would begin to move her crude-oil production allowable downward with the end of the Japanese war, regardless of federal action.

"It cannot be done in a day," said Jester, "but must come gradually from the 2,359,615 current daily allowable toward the 1,382,637 allowable of 1940 in order to save the oil industry from severe losses. This commission proposes to take the situation into its own hands to protect our Texas producers if the federal Government fails in that duty.

"Control belongs to the states regardless of what Mr. Ickes or anyone else may think. If Mr. Ickes objects, we might as well have the courts decide that with hostilities over the states are once more in supreme control of their natural resources. It is unbelievable that the courts would decide differently.

"It may be necessary to have this clash to insure the resumption of power by the states. Of course I would regret a court row with Mr. Ickes, but if it takes that to protect our control of our national resources and the protection of our oil producers, then let it come."

Navy Begins Drilling Test Well in Northern Alaska

WASHINGTON.—The Navy has begun drilling its first test well in Naval Petroleum Reserve No. 4, a tract of 35,000 square miles which it staked out 20 years ago in northern Alaska. Reporting on a project started more than a year ago the Navy says about 200 men are at work on it to determine whether the reserve actually contains oil in commercial quantity. Capt. Bart W. Gillespie, leader of the expedition, says there is substantial evidence that it does.

"The presence of favorable geological structures and oil seeps containing oil of high quality and one which will permit handling at extremely low temperatures is in itself sufficient to justify investigation by any soundly operated oil company," Gillespie reported.

Even if the well should result in a producer, the Navy does not intend to develop the field. That would be done only if a national emergency dictated and then, under established naval policy, the job would be turned over to the private oil industry.

The drilling test is at Umiat, on the Colville River, about 180 air miles from Point Barrow, but some 330 miles by the land route over which 1,000 tons of heavy oil-field and runway equipment, and fuel and provisions, were moved to the scene.

Reconversion Program To Begin Immediately

(Continued from page 100)

will be available for foreign governments and private companies to resume activities without restrictions.

Censorship and military security controls will come off of technical information immediately, though it may take some time for this fact to sink in so that there will be a free exchange of commercial and scientific data.

As war activities are dropped there will be many changes in official personnel in Washington. Secretary of the Interior Ickes is not expected to leave the cabinet soon, but this will not affect the orderly liquidation of PAW. The Anglo-American petroleum agreement most likely will be renegotiated as a multilateral treaty within the framework of the United Nations organization.

Biggest unsolved problem is disposition of Government-owned facilities, and this awaits decisions by Congress. Some tankers will be sold on individual negotiations but postwar merchant-marine policy is not yet set. The big-inch pipe lines will be operated as at present for some months, but the Government has no plans for their disposition. Synthetic-rubber and butadiene plants will be operated close to capacity by the Government as it is expected to require from 1 to 2 years before plantation rubber comes back in quantity and the world-wide rubber deficiency is made up.

XUM

Colonel Thompson Grateful for Security Which Imports Afford

AUSTIN.—Col. Ernest O. Thompson, of the Texas Railroad Commission, refuses to become panic-stricken over oil shortages with which some scientists say the nation is threatened. In a statement presenting his views Colonel Thompson points to vast petroleum reservoirs in other parts of the world which are likely to lie ready for development after this country's resources have become inadequate to meet demands upon them. Incidentally, however, he insists "you don't have to worry about gasoline for at least the next 50 years from home sources of oil, gas, and shale."

"Whenever you suggest that in case we should run short of crude in this country our needs could be supplemented by imports from abroad, you immediately hear the cry that imports would ruin our oil producing industry," says Colonel Thompson.

"We should not import oil unless our domestic supply is short. So long as we can produce all the oil we can consume at a fair price to the consumer and producer alike there should be no unnecessary importation of oil.

"Certainly we should not produce our oil wells faster than good operating practice would dictate. They should operate no higher than the most efficient rate of production.

"That means the rate of flow which in the long life, the entire life of field will bring to the earth's surface the greatest possible total amount of oil for the use of mankind. That means true conservation in production as contrasted to hoarding by needless shutting in of wells.

"So, to sum up on import of oil, the extent to which foreign oil—that is oil produced out of the United States in time of peace should be determined in part by the effect such importation of oil into the United States would have upon our domestic oil-producing industry. We must at all times be sure we maintain a healthy prosperous oil-producing industry here at home. That is our best security.

"We should avoid importation of oil which would unduly depress the domestic-market price and thereby deplete the resources of domestic companies and individuals here at home and thus adversely affect the incentive of the domestic oil industry in exploration and technological development.

"But suppose now that all our oil fields are producing every barrel that their good operators feel that they should produce without harming the wells, and still the demand for oil is greater than our domestic wells can supply. Then it is well that we have American companies who have had the foresight to go out and prospect abroad and locate billions of barrels of oil ready for our call when needed to fill our markets at home and abroad.

"Certainly those companies can economically compete for those markets near the source of these foreign oil supplies. They have erected huge refineries at the oil fields and they are even now helping hugely to fill demands for oil and gasoline in the Near and Far East.

"It is the plan that an international treaty or oil compact shall be worked out open to all oil-producing countries to the end that amicable working agreement may be had so that no future war can ever come about over oil.

"There has already been worked out a world-wide monetary scheme and a world-wide agreement on food both approved by our Congress. The same plan under the United Nations world security scheme would mean world agreement should be had on oil so that one more cause of war may be written off."

Lubricant Developed for Jet-Propulsion Engines

CHICAGO. — Engineers at the Wood River laboratory of Shell Oil Co., Inc., have revealed details of a lubricating system for jet-propulsion engines which they have developed in the course of research into fuels and lubricants for this type of power unit. The system employs a mist-like spray consisting of 95 per cent chilled compressed air and 5 per cent oil.

The spray is directed on the ball bearings at either end of the engine, on which the single longitudinal axle revolves. The air cools the metal and the oil protects it from foreign matter and rust. After lubrication is completed, the spray is exhausted into the jet.

Lubrication problems of the jet-propulsion engine, where the axle is the only moving part, are in marked contrast with those of the conventional internal-combustion aircraft engine, which has hundreds of moving parts and where the lubricant must cool, seal, lubricate, scavenge, act as a gear lubricant and as a hydraulic fuel. The jet-propulsion lubricant has not only to cool and lubricate, but it must fill certain other requirements not demanded of other lubricants.

Because it passes from extremely low temperatures (usually well below zero) to temperatures of 800° to 1,000° in a matter of seconds, it must be a very stable oil capable of flowing through the lines at these low temperatures and yet not breaking down when suddenly exposed to intense heat.

Even more important, the jet lubricant must provide complete protection from rust. The same Shell engineers who developed the rust-preventing turbine oil now used by the Navy are searching for a lubricant whose rust-inhibiting characteristics will be maintained under jet-engine conditions. The perfect jet-engine lubricant, they said, will be light and highly refined, because it must burn off clean, leaving no deposits on bearing surfaces.

Ship Deliveries for July Include 15 Tankers

WASHINGTON. — Among the 97 vessels delivered to U. S. Maritime Commission during July were 11 standard tankers and 4 coastal tankers. Alabama Dry Dock & Shipbuilding Co., Mobile, completed three standard tankers; Kaiser Co., Inc., Portland, Ore., three; Marinship Corp., Sausalito, Calif., one; Sun Shipbuilding & Dry Dock Co., Chester, Pa., four. J. A. Jones Construction Co., Inc., Panama City, Fla., completed one coastal tanker; St. Johns River Shipbuilding Corp., Jacksonville, Fla., one; Todd-Houston Shipbuilding Corp., Houston, two.

Ethyl Corp. Establishes Four Marketing Areas

Ethyl Corp. has reorganized its sales department field operations, establishing four principal marketing areas—eastern, central, southern and western. Area sales managers named are Richard C. Murphy, eastern; James E. Boudreau, central; Harold R. Berg, southern; Sanford M. Wagner, western.

George Krieger is named to the new post of special assistant to the general sales manager. Donald S. Flynn, formerly assistant manager of the Kansas City division, has been appointed manager to succeed Berg, southern sales manager. Wagner will retain, for the present, his position as manager of the Los Angeles division while serving as western sales manager. Matthew A. Taylor, former manager of the Boston office, has been appointed manager of the newly created division in Philadelphia.

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XUM

MEMO: To small refiners

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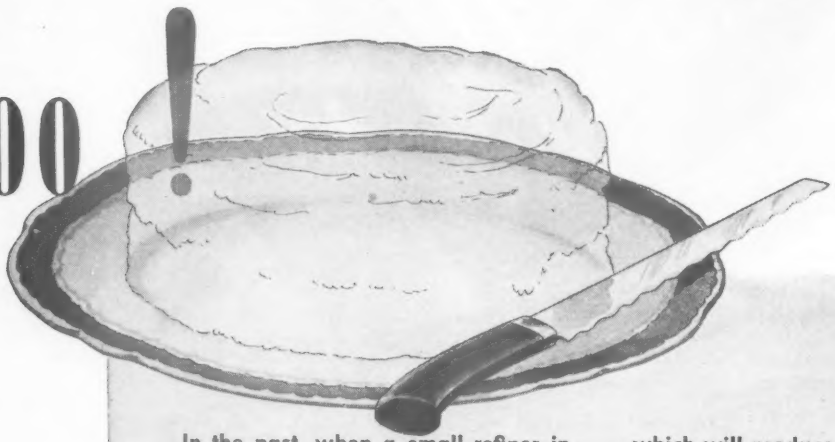

In the past, when a small refiner increased octane, he usually sacrificed both yield of gasoline and profits. Now, with a small TCC unit, he can step up earnings and octane number simultaneously.

Houdry now offers a new, small TCC unit (2,000 b/d to 3,000 b/d) which will produce high octane gasoline as cheaply as cat crackers many times its size. Detailed studies show that, on the basis of anticipated post-war octanes, this TCC unit can earn more than 40% of its capital cost per year. Interested refiners are invited to ask for a look at the figures!

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Postwar Outlook Promising For Natural-Gas Industry

NEW YORK. — The postwar outlook for the natural-gas industry will be one of the brightest of industrial pictures, if the industry is allowed to follow its normal course of expansion without being overburdened with restrictive legislation that is not in the public interest, R. H. Hargrove, chairman, Natural Gas Department, American Gas Association, and vice president and general manager, United Gas Pipe Line Co., declared last week.

The industry has been faced with an increasingly tremendous responsibility during the war emergency in supplying record quantities of gas for domestic, industrial and commercial uses, Hargrove said. The difficulties have not been due necessarily to the record quantities furnished but more to needed additional facilities and rearrangement of existing facilities to supply gas where it has been required most for industries directly engaged in war work. The industry never lacked faith in its ability to deliver the record quantity of gas required for the war effort. It will continue to produce and deliver the increased load necessary to supply postwar needs, Hargrove said.

Reserves of natural gas were recently estimated by E. DeGolyer, Dallas, consulting geologist, at approximately 200 trillion cubic feet. Proved reserves at the beginning of 1945 were more than 140 trillion cubic feet, based on surveys of fields having reserves of more than 20 billion cubic feet, plus reserves of the Appalachian area. Making allowance for lesser fields and for probable expansion of discovered fields the estimated reserves of 200 trillion cubic feet are conservative. With estimated withdrawals at 4 trillion cubic feet for 1944, the ratio of reserves to present consumption is better than 35 to 1.

Hargrove said a recent breakdown of postwar expenditures made by the Federal Power Commission at the request of A.G.A. showed that the natural-gas industry will spend $160,898,000 for plant expansion, maintenance and inventories and supplies in the 12 months immediately following V-E day. Of this amount, approximately $120,000,000 would be spent on additional plant and equipment.

The FPC estimated revenues from sales of natural gas to ultimate consumers for the 12 months ending May 1946, would be $619,398,000. This figure does not take into account sales by natural-gas companies to other utilities for generation and resale. Total revenues from the sale of natural gas for 1944, according to the A.G.A.'s report, were $677,951,900. Sales by the industry for the 12 months ended May 31 last were nearly 8 per cent ahead of the comparable period a year earlier and it is estimated that dollar sales for 1945 will cross the 700 million mark.

The immediate postwar picture was brightened by the lifting at the end of July of restrictions on the sale of gas cooking ranges and the announced intention of the War Production Board to remove as rapidly as possible remaining restrictions covering the manufacture and sale of household equipment.

There exists a huge potential market for gas ranges, gas water heaters, gas refrigerators and house heaters, for replacement of worn equipment and installation in new homes. The natural-gas companies are determined to capture a good share of this postwar business. Looking to the possibility of extended markets, the industry has filed projects or has recently received approval of the FPC for the construction of nearly 5,000 miles of additional natural-gas pipe line in this country, capable of transmitting more than 400,000,000 additional cubic feet a day at peak movements.

Industry leaders foresee an excellent opportunity to help solve the postwar employment problem. Manpower in the gas industry currently is about 10 per cent below 1939, a normal prewar year. The proposed expansion of plants and transmission facilities, development of improved products and methods of preventing waste and new processes of utilization will mean more jobs in postwar days.

Recognizing that natural gas is a natural resource it seems that the interest of the FPC and of state governments in determining whether this product is being conserved and utilized in the most efficient manner has reached a peak during the past year. The FPC recently declared it has no desire to extend its jurisdiction over the natural-gas industry beyond regulating the transmission of this natural resource in interstate commerce. Adherence to that policy, it is said, will give the industry the confidence and security that the railroad industry enjoys under the equitable jurisdiction of Interstate Commerce Commission.

Texas Asked to Increase Oil Output in September

AUSTIN.—A rate of 2,366,000 bbl. daily of all petroleum liquids has been certified to Texas for production throughout September by Petroleum Administration for War. This is an increase of 10,000 bbl. over the August certification. The additional output is to come from asphalt-type fields where the necessary productive capacity is available within maximum efficient rates.

PAW will continue to issue production certifications for a brief period after the cessation of military activities. Continuation of the practice should assist materially in bringing about return to normal operations in an orderly manner, Deputy Administrator Ralph K. Davies explained.

Referring to the increased rate for Texas during September, Davies said:

"Because refineries were geared to produce maximum quantities of gasoline until the end of the European war, some specialty-type crudes, such as the asphalt-bearing class, were not suitable for complete utilization within limits of availability. Present concentration on fuel-oil production now makes it possible and desirable to refine as much of these asphalt-type crudes as can be supplied. It has been necessary, therefore, to increase the production certification to obtain the full supply of crude oil that can be produced from asphalt-type crude oil fields in Texas within maximum efficient rates."

Tariff Commission Predicts Higher Prices for Oil

WASHINGTON. — Postwar prices for crude oil and its products will be higher than the 1939 base, according to prediction of U. S. Tariff Commission in its report on "Postwar Imports and Domestic Production of Major Commodities."

A reduction of 50 per cent in the duty on gasoline probably would not result in any material increase in imports, assuming the duty on crude petroleum also were reduced, the report asserts.

Consumption of gasoline may total 750,000,000 to 800,000,000 bbl. annually, or 30 to 40 per cent more than in 1939, the report says, based on the trend 1920 to 1940.

Continuing improvements in both automobiles and gasoline seem likely to be more than offset by increases in number of vehicles and greater mileage per vehicle per year. Increase in use of airplanes will affect consumption of gasoline.

XUM

North Carolina's Oil Exploration Continuing

RALEIGH, N. C.—Drilling for oil in the mid-coastal area of North Carolina will be resumed within a few weeks on lands leased by the Coastal Oil Co., Dr. J. L. Stuckey, state geologist, said today. New equipment will be brought in by the contractors, he said, and plans are being made to go ahead with operations at five sites.

The first well, drilled near Morehead City, was abandoned.

At the same time, the Standard Oil Co. (New Jersey) expects to move drilling equipment into the northeastern part of the state to commence the first well there within the next 6 to 8 weeks. Meantime, geophysical research will continue in that area where four companies have leases.

Secondary Recovery From Lime Pool, Basis of Report

WASHINGTON.—Injections of gas —one of the secondary methods of recovering petroleum—into the McClosky limestone formation of the Griffin and New Harmony oil fields in Indiana and Illinois has resulted in an encouraging increase of oil production from 37 wells of that area, according to an engineering survey released last week by the Bureau of Mines.

About 85,000 bbl. of oil were obtained in 2 years by injecting 500,000,000 cu. ft. of excess gas through seven converted wells in the limestone reservoirs, the bureau's report shows, yielding oil which might not have been produced through the continued use of primary recovery methods.

All of the gas used to force the petroleum to adjacent pumping wells in the two fields was denuded residue gas, or gas from which gasoline had been removed at natural-gasoline plants.

The bureau's survey based on records of producing companies in the district, was prepared by C. H. Riggs, petroleum engineer, and is another in a series published recently to stimulate interest in secondary recovery of petroleum for wartime needs, Dr. R. R. Sayers, director of the bureau, reported to Secretary of the Interior Harold L. Ickes.

Although air and gas under pressure have been used successfully for many years to increase the rate of oil production from sandstones, the Griffin and New Harmony fields projects represent the first large-scale operations in limestone reservoirs in the deeper fields of the Illinois basin.

Since secondary-recovery projects in limestone reservoirs are not numerous, and involve problems not usually encountered in sandstone formations, the information by the bureau will furnish additional technical guidance for other oil producers.

The report includes a discussion of the development, production, and reservoir conditions in the Griffin and New Harmony fields and also shows the estimated oil gained from the wells affected by gas injection. It includes data on the time elapsed between the start of gas injection and the first noticeable increase in the rate of oil production.

A copy of the survey, Report of Investigations 3818, may be obtained by writing the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Esso Assures Job Security For Returning Veterans

WASHINGTON. — The job-security plan adopted by Standard Oil Co. of New Jersey for returning veterans is designed to protect the serviceman's position for him while he is absent, whether he volunteered, was drafted, or was called up as a reservist. This was explained to a group of civil service officials, economists, college instructors, and magazine writers by F. W. Pierce, director of Standard Oil Co. (New Jersey), the parent company, at a forum on the oil industry's approach to employe security. Pierce said the principal features of the plan were:

1. Each employe who has been with the company a year or longer is given 2 months' salary as he enters the armed forces.

2. His dependents receive monthly payments from the company while he is away—up to half of his former company's pay.

3. Each employe has been assured by letter from his company president, Eugene Holman, that his old job—or another as good or better—will be waiting for him. Experience gained in the armed forces may result in his immediate advancement.

4. His rights in company retirement and benefit plans are protected while he is away.

In helping small business, Pierce said that the business assistance plan has been developed, the aim of which is to include:

1. Suggestions for postwar service station designs.

2. A list of recommended equipment now generally available, to which will be added new equipment from time to time.

3. Modernization of existing service stations to meet postwar needs for petroleum products and the handling of other services for automobiles, trucks and air travel.

DEATHS

Dr. Merle H. Meacham, 58, manager of the Baltimore and Charleston refineries of Standard Oil Co. of New Jersey, died August 3 in Baltimore. Dr. Meacham received bachelor of science and master's degrees in chemistry at Purdue University and his doctorate at Syracuse University. He joined New Jersey Standard as a chemical engineer in 1918.

George J. Seel III, 56, statistician for Standard Oil Co. of New Jersey, which he had served 25 years, died August 4 in Orange, N. J.

Edward S. Rothchild, 53, vice president Rodpak Manufacturing Co., died July 28 at San Mateo, Calif.

Hoyle Jones, 58, district sales manager of Republic Steel Co., died of a heart attack August 14 in Tulsa.

Walton C. Poole, 55, electrical engineer at the Hammond, Ind., plant of Sinclair Refining Co., died August 7. He had been in Sinclair service more than 25 years.

John H. Rose, 18, president of Bradford Oil Refining Co. at the time of his retirement several years ago, died August 8 in Bradford, Pa.

Curtis Webb, 57, consulting petroleum engineer, died of burns suffered in an oil-burner explosion at the plant of San Miguel Oil Co., near Oxnard, Calif. Torrey H. Webb, a vice president of The Texas Co., is a brother.

Thomas J. Hickey, 42, an executive of Standard Oil Co. of New Jersey, died August 11 of a heart attack in Hot Springs, Ark.

Herman Layer, 68, retired oil operator, died August 5 in Los Angeles. Layer was active in development of oil fields in Wyoming, New Mexico, and California, including the Signal Hill and Santa Maria areas.

Robert G. Taylor, 61, pioneer in the development of Elk Basin, Pilot Butte, and Lost Soldier fields in Wyoming, and founder of Argo Oil Co., died in Denver August 4 of a heart attack.

Joseph H. Rounsavell, 45, Los Angeles oil man, was found dead last week in his garage, which was filled with carbon monoxide fumes. Rounsavell was said to have been depressed over protracted illness.

Fred T. Morrow, 45, drilling contractor and producer, died August 11 in Howard, Kans.

HYCAR PISTON PERFECT FOR TOUGHEST OIL FIELD PUMPING SERVICE

Handles drilling mud, cement, acid up to 10,000 psi

Photos courtesy Halliburton Oil Well Cementing Co. Hycar parts by Texas Rubber & Specialty Corp.

AN easy way to waste a good many thousand dollars is to let a cement pump fail while either the casing or tubing in an oil well is filled with cement. That's why Halliburton Oil Well Cementing Company—known for the care with which its experts select each item that goes into a pumping unit—uses pump pistons made from Hycar synthetic rubber. That way they can be *sure* that failures won't occur.

The same units handle drilling mud and acidizing fluids with equal assurance of perfect performance. That's because Hycar provides a combination of properties that enables it to tackle and lick the really tough jobs where other materials fail. High abrasion resistance; resistance to oils, acids, most chemicals; ability to *stay* resilient and maintain a positive seal; these are just a few reasons why Hycar is practically the standard resilient material in the petroleum industry. Other important properties of Hycar are shown in the box at the right. They'll help you understand why Hycar is the ideal material for gate packers, mud line valves, blow-out preventers, gaskets and hose of all kinds, and many other items where these properties are needed.

Ask your supplier for parts made of Hycar. Test them in your own applications — difficult or routine. Learn for yourself that Hycar can help you reduce operating costs—that it's wise to use Hycar for long-time, dependable service. *Hycar Chemical Company, Akron 8, Ohio.*

WHAT HYCAR DOES IN OIL FIELD APPLICATIONS

1. *Resists oil and gas—even under high pressures and temperatures.*
2. *Resists action of abrasive-laden fluid under high pressure and at high velocity.*
3. *Wears at slow rate even under worst conditions.*
4. *Makes a positive, leak-proof seal, even after a long period of service.*
5. *Provides high elasticity.*
6. *Gives high tensile strength.*
7. *Has minimum tendency to cold flow and compression set.*

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Synthetic Rubbers

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Paloma Unit—An Advanced Oil, Gas, And Products Producing Operation

by Kenneth B. Barnes

1—The Field, Its Size, Character, Contents

THE Paloma field is located 25 miles south and slightly west of Bakersfield, in Kern County, California. Discovery well was Western Gulf Oil Co. 54-3 KCL, in 3-32s-26e.

Structure is an elongated anticline, northwest-southeast. The Paloma sand is found at 10,000 to 12,000 ft., with the pay approximating 180 net feet through about a 500-ft. section. Porosity is on the order of 20 per cent, and in significant thicknesses of pay the higher side of the permeability range is 100 md.

South side of the structure is not productive because the sand becomes impermeable.

Crest of the reservoir is filled with light hydrocarbons, present in the gas phase under original pressure of 4,760 psi. Liquefication, or retrograde condensation occurs with lowering of pressure and about 1 bbl. of 54° A.P.I. condensate is producible with 7,000 cu. ft. of gas. One purpose of the plant, accordingly, is to "cycle" or return the

PART 1

In this article and two to follow, the Journal presents an exclusive bird's eye picture of the Paloma oil, gas, and products producing operation. Many "firsts" and combinations of advanced features are present in this most modern project. As a hydrocarbon-recovery project it is classified as one of the most scientifically arranged programs in existence. Because of the many phases, details, and multitudinity of equipment involved, the complete description is made, for brevity, in "picture" form, accompanied by condensed data and discussion.

dry gas to the reservoir to reduce condensation in the formation by maintaining pressure. Present cycling program is to inject along crest of the structure and produce from wells located on the northeast flank.

A pilot plant, consisting of a 300-hp. compressor and separation equipment, was installed and operated for 2½ years to thoroughly test the cycling procedure and injection characteristics. Numerous electrolytic model experiments were performed in developing the well-layout and injection-production program.

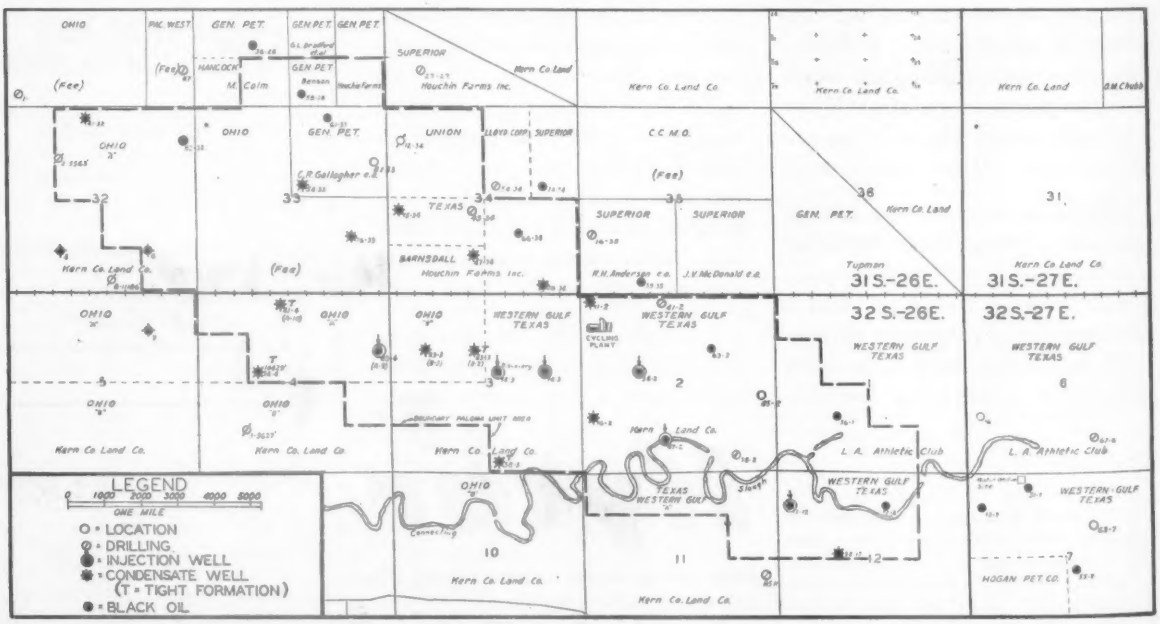
Flanking the gas cap on the northern side is a more recently developed black-oil belt producing 33°-gravity crude oil.

A block of 3,600 acres of the Paloma sand is unitized. Participating acreage may be increased as it is proven productive. Drilling, producing, and plant policies are determined by the Paloma Operators' Committee, which is participated in by Barnsdall Oil Co., General Petroleum Corp., The Ohio Oil Co., Union Oil Co., The Texas Co., and Western Gulf Oil Co. (operator).

The plant and line systems were designed and constructed by C F Braun & Co., Alhambra, Calif.

One estimate places the general order of reserves per acre at 166,000,000 cu. ft. of gas and 24,000 bbl. of condensate in the gas-cap area, and 100,000,000 cu. ft. of gas and 100,000 bbl. of oil in the black-oil area.

Underground conservation and efficient recovery will reach a high degree because of the cycling and pressure-maintenance program.

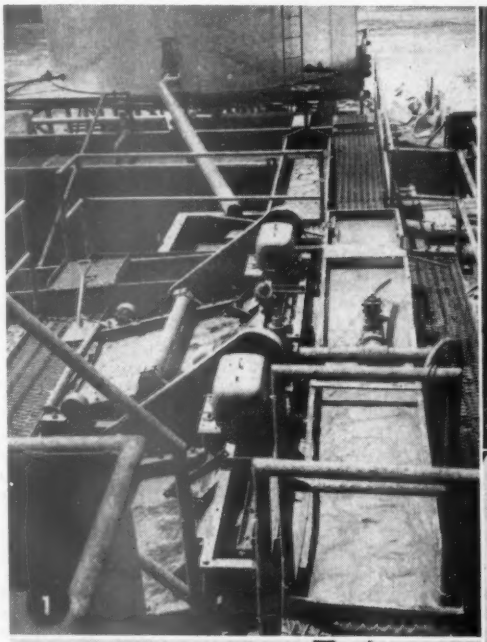


Map of the Paloma pool, showing present boundary of the unit area, plant location, input wells currently in operation. Black-oil wells are on the northern flank of the structure

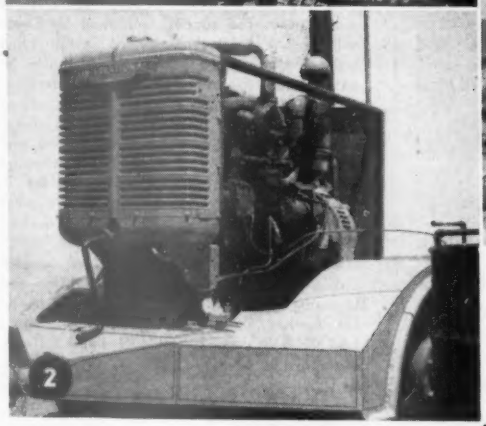
2—Drilling the 10,000-12,000-Ft. Wells

WITH water plentiful and a ready supply of gas, heavy steam rigs are common. From 90 to 100 days are spent on drilling and completion. Final casing string usually is 7-in. o.d. set and cemented through the pay zone.

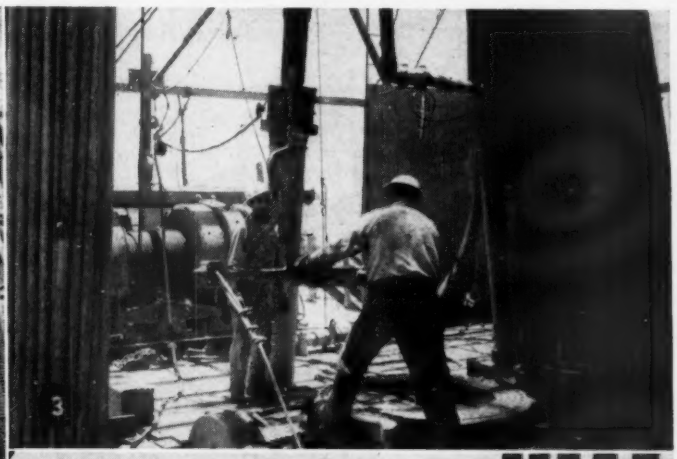
Completions are made by gun-perforating, with the intervals selected from sample, electric-log, and core data. Two-inch external upset tubing is used. Direct drilling and completion cost, including well-head fittings, at present is approximately $200,000 per well.



1—Some rigs use unitized steel mud tankage and circulating troughs, two mud screens. Equipment pictured is mud system used by Superior Oil Co. of California



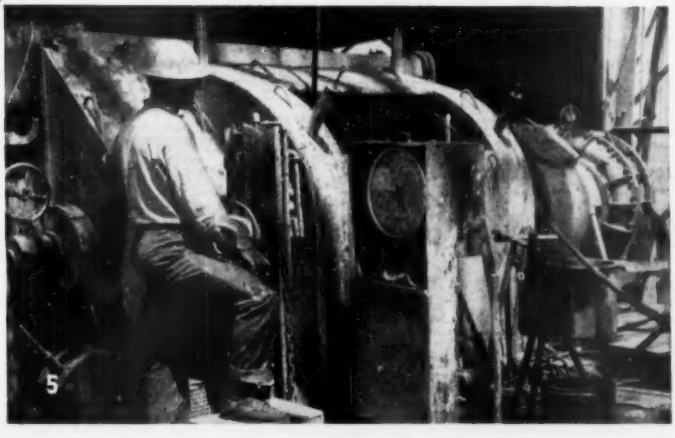
2—Two-wheel trailer unit is quickly set up for furnishing electricity. With a small trailer hitch, it is readily hooked behind a car or truck



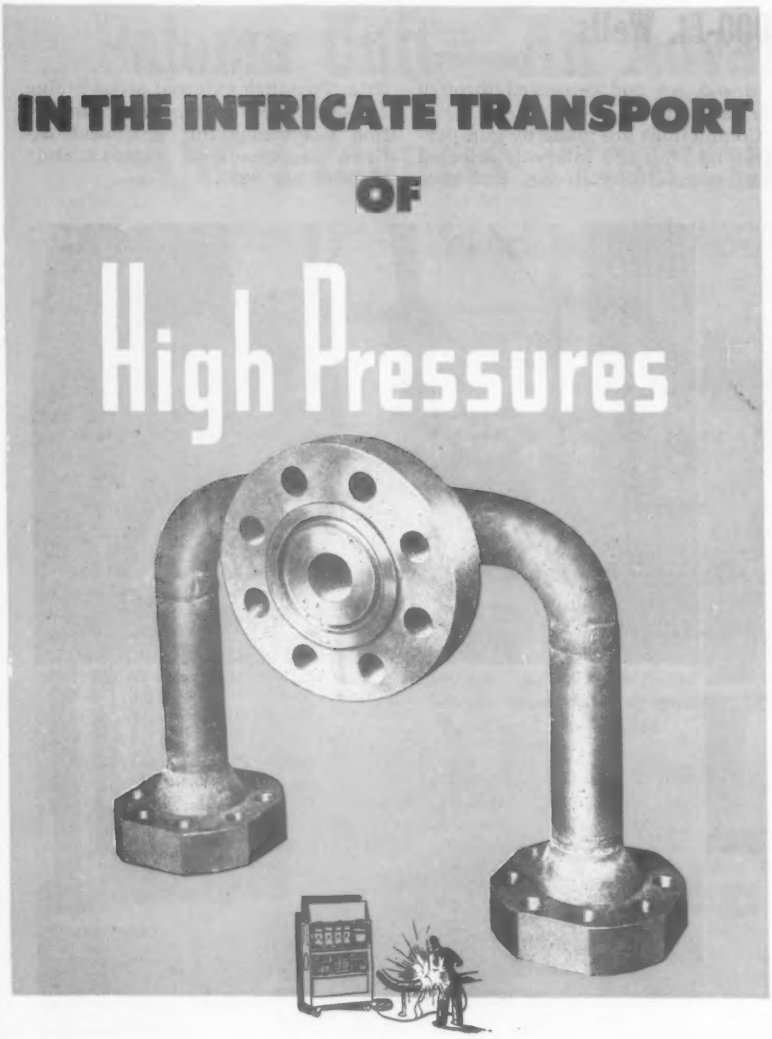
3—Deepening a Paloma well after original completion. Tubing is stacked at left, drill pipe at right. Standby draw works in rear. Much care is devoted to sample examination, coring and core analyses, electrical log data because the structure is sharp, approaching 2,000 ft. per mile in places, and the condensate, black-oil, and water intervals vary

4—Battery of five insulated 107-hp. superheated, drilling boilers and unitized feed-water pumps, and water-treating equipment

5—Two draw works, one a standby, are common with 136-ft. derrick, 10-ft. substructure. Moves are easy because of flat surface, good roads



IN THE INTRICATE TRANSPORT OF High Pressures



It would take some computing to evaluate the importance of fabricated piping used in the tricky business of transporting high pressures. Whatever its worth, science and industry find it essential to an ever greater degree.

Naturally ordinary methods and equipment are not sufficient to produce this type of work. Associated has designed and built exceptional equipment... not available elsewere...which amplifies a vast knowledge and high skill in the fabrication of high pressure piping. Look to Associated for progress in piping.

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ASSOCIATED *Progressive* **PIPING**

TROY, ALABAMA

Now Has a Layne Automatic Water System

City Officials of Troy, Alabama are in high spirits these days. Where all others have failed, Layne has just completed a water system WITHIN THE CITY LIMITS that produces over 1,000,000 gallons daily. Furthermore this new system is equipped with the latest automatic control device which eliminates manual starting and stopping.

Prior to the completion of this New Layne System, all water for the city of Troy was obtained from wells located some three miles away. The success achieved by Layne will now enable the city to install other wells and thus abandon the distantly located and expensive to operate system.

Here again is proof that Layne's experience, knowledge and specialization always pays handsome dividends. Building this well was no easy task. It was drilled through rock strata from one to sixteen feet in thickness. Some five-hundred bags of cement were used to seal off all but the desired water bearing sand formations.

Layne is now almost entirely engaged in civilian Well Water System building—and is ready to serve you. Write, wire or phone for further facts, catalogs, bulletins etc., LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

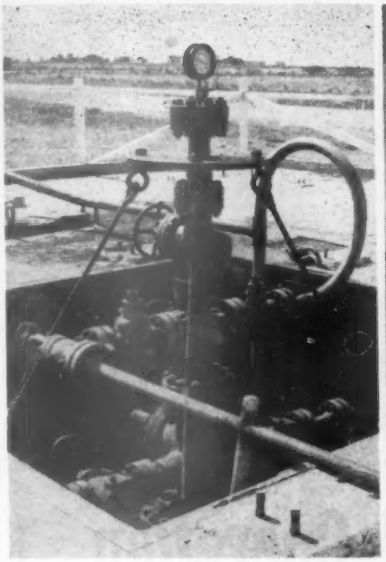
LAYNE PUMPS *—fulfill every need for producing large quantities of water at low cost from wells, streams, mines or reservoirs. Send for literature.*

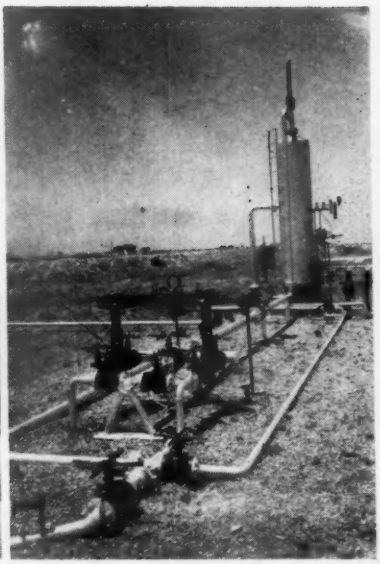
AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

3—Well-Head and Field Equipment





Left: Dry gas totaling 50,000,000 cu. ft. per day from the plant (at 190° F.) is being returned to the reservoir at 4,400 psi. through the injection wells. Condensate producing wells are equipped the same as injection wells. Soil is corrosive so pipe is laid on support tiers above ground on 25-ft. centers. Insulation on all lines maintains uniform temperature to plant and prevents hydrate formation. Expansion loops are at 1,000-ft. intervals. Total production is 55,000,000 cu. ft. per day. Wells produce at 2,200 to 2,800 psi. surface pressure. Right: Present equipment at individual black-oil wells. Oil and gas are separated, metered, then recombined. In the future, however, three-stage field separation will be used

Condensate

AT present there are 10 condensate producers in operation and six wells on injection service. There is an individual line to each well, 3½-in. o.d. double extra-strong, good for 5,000 psi. working pressure. At the plant each line is connected to two main headers, production and injection, and also to a small header used for production tests and determining meter factors for the condensate.

Black Oil

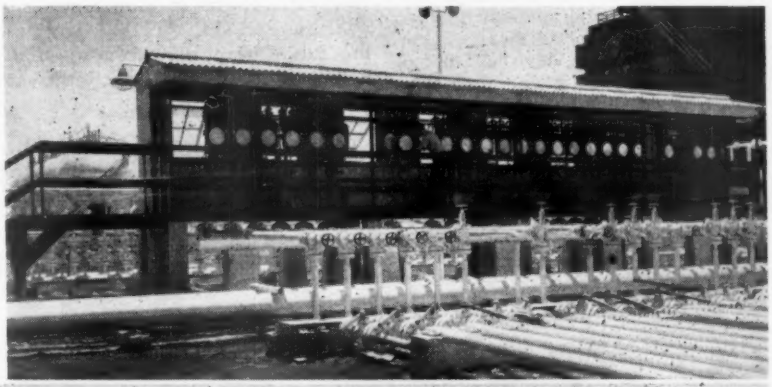
TOTAL black-oil production currently is 1,700 bbl. per day but being rapidly increased by new completions. At first, no separation of oil and gas was made in the field, although a test unit was placed at each well for gaging purposes only. This worked as follows: The oil was separated at 500 psi. and measured through a displacement meter, and the high-pressure gas through an orifice meter. A short distance downstream the oil and gas were recombined into one stream and sent on to the plant.

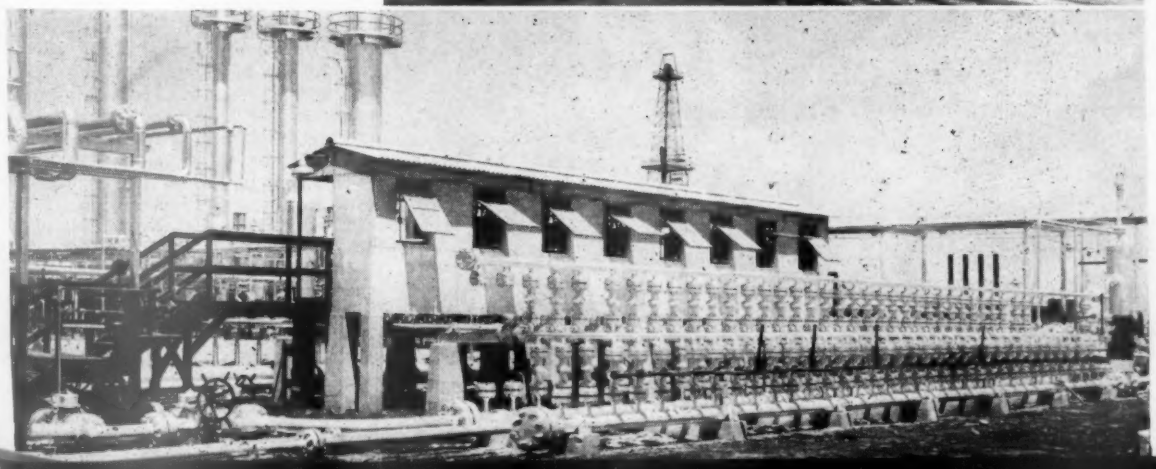
Concurrently, however, several trap and tank settings are being made at points throughout the black-oil area, with separation to be made at 800, 300, and 75-psi. stages. Tank vapors will be collected and compressed to 75 psi.

4—Gas Control Manifolds and Metering

Pictures on this page courtesy C F Braun & Co.

Right: Adjustable flow beans set production of each condensate well. Orifice meters operate at 2,000 psi. Run is horizontal, with flange connections; there are self-draining taps, no seals. Orifices are drilled off-center, placed tangential to bottom. Below: Each meter is manifolded to test separator for determining gas-condensate ratios and meter factors for determining the volume of gas and liquid production, and is valved to both production and injection headers to provide choice of operation. Injection wells may be "back-flowed" to test separator without shutting down plant





XUM

Machine shop with lathe in foreground set up with universal grinder

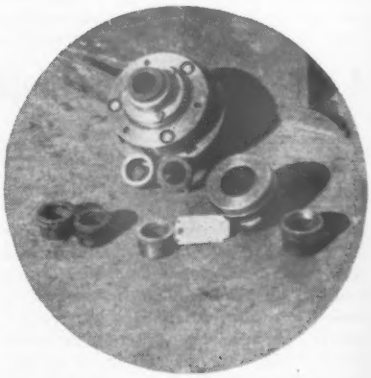
Methods and Repair and Operation Of Magnolia Pipe Line Pump Stations

by Paul Reed

FOR increasing the effectiveness of several phases of pump-station maintenance and operation, Magnolia Pipe Line Co. has developed certain special practices which depart from customary procedures. Some of these have been devised for the purpose of repairing equipment so that it may better withstand the severe demands of diesel engine-reciprocating pump service.

In one case measures have been taken for snubbing the shocks of pump operation by a change in valve design. In order to accomplish this, a new principle has been utilized to improve operation of the discharge valves for certain types of reciprocating pumps. A special valve has been designed which incorporates features for dampening surges and even eliminating them to a great extent. These valves were installed in instances where plunger displacement was responsible for surge due to the conventionally designed valve action. Previously other means had been tried which were found to be ineffective for eliminating this surge trouble. These special hydraulic shock valves produced remarkable results in effecting smooth and quiet action with a no-

A. W. Fry, assistant superintendent of maintenance, and A. R. Ehrhardt, superintendent of maintenance, Magnolia Pipe Line Co., collaborated in development of the ideas, methods, and applications of practices described in this article.



Left: Throttling shock valves of two types: vane-guide type and cage-guide type. Above: Valve seat machine fixtures for grinding valve seats

You are headed for long years of low maintenance — and high operating efficiency — when you lay your lines with Quality Controlled

J&L SEAMLESS LINE PIPE

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JONES & LAUGHLIN STEEL CORPORATION
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SEAMLESS CASING AND TUBING · J&L INTEGRAL-JOINT DRILL PIPE
LINE PIPE · WIRE ROPE

In the Limelight

With more and more high sulfur crude coming on the market, the Perco Catalytic Desulfurization Process is gaining greater attention every day as an economical means of removing 80-98% of the sulfur content from straight-run gasolines and 90-100% from natural gasolines. Since the presence of sulfur compounds in gasoline reduces the tetraethyl lead response, the primary function of Perco Desulfurization is to remove the sulfur and produce a gain of several octanes. This process provides an easy, inexpensive way of obtaining a sharp improvement of product quickly. Why not invite a Perco Engineer to talk over the application of the low cost Perco Catalytic Desulfurization Process in your refinery?

PROCESSES ★ ENGINEERING
PERCO
RESEARCH ★ CONSTRUCTION

A *Division* OF

PHILLIPS PETROLEUM COMPANY, Bartlesville, Oklahoma

ticeable gain in the efficiency of the pump.

This hydraulic shock valve closes gradually with a snubbing effect. It has been assumed that theoretically the chamber of a pump is completely filled at the beginning of the discharge stroke. A study of the usual operating conditions led to the conclusion that the chamber was not completely filled. Due to the lag and throttling effect of the special hydraulic shock valves, the pump chamber is entirely filled and the plunger moves the oil from the chamber without any surge and accompanied by a smooth valve action.

Only one of these hydraulic shock valves is needed in each of the discharge valve chests. This valve is installed in the valve seat nearest the end of the plunger stroke. This type of shock valve is not strikingly different in appearance from other wing-guide valves excepting its special dampening features.

Valve Maintenance

Reconditioning of reciprocating-pump valve seats has been accomplished by employing two different steel electrodes. The first one applied is of soft ductile metal which overlays by direct contact the parent metal of the seat, for the purpose of restoring the height of the seat shoulder. The soft ductile metal applied in this manner is overlaid by metal from a hard electrode for the seating surface of the valve. The combination of these soft and hard materials resists shock more satisfactorily and has proved to be more durable than one material alone, such as the metal from the hard electrode applied directly against the parent metal. Long service has been obtained with valves prepared in this way. The narrow chamfered seat resulting from this method of application gives excellent service and does not crumble. Valve seats reconditioned in the above manner maintain their seats at the original dimensions. To recondition the valve, the hard weld metal is cut or ground out and the same procedure as to the seats is followed. Lines of separation do not occur with the valves in operation, between the weld metal and the original metal of the valves.

Special Welding

A process has been developed by the company to employ a reinforced electric weld which has flexibility, ductility, strength, and ability to prevent leakage. The strength of the weld has been demonstrated in numerous cases where broken cylinder-liner flanges were repaired by this method with the result that they were apparently restored to their original strength.

In some cases, cylinder liners which have been broken behind flanges have been repaired in the same manner. In one instance a cylinder liner so repaired was cracked for two-thirds the distance around the circumference and after being repaired, severe tests indicated the soundness of this welding procedure.

A universal grinder was designed at the company's shop which has many advantages not found in several of the commercial tool post grinders. This grinder has been made so that it serves all general grinding jobs. Because of certain features it can be positioned for a variety of work and can be operated at angles encountered in both internal and external jobs. For heavy grinding on external jobs, wheels with diameters as large as 10 in. are used with two speeds: 2,200 and 5,000 r.p.m. Internal speeds used are 15,000 and 24,000 r.p.m. Both of the wheel mandrels for external and internal work have the advantage of a roller-bearing design which provides a self-adjustment. At the same time, bearing slack has been prevented, thus eliminating a common cause of vibration in grinders. There is no heating and binding in the bearings of this type of grinder.

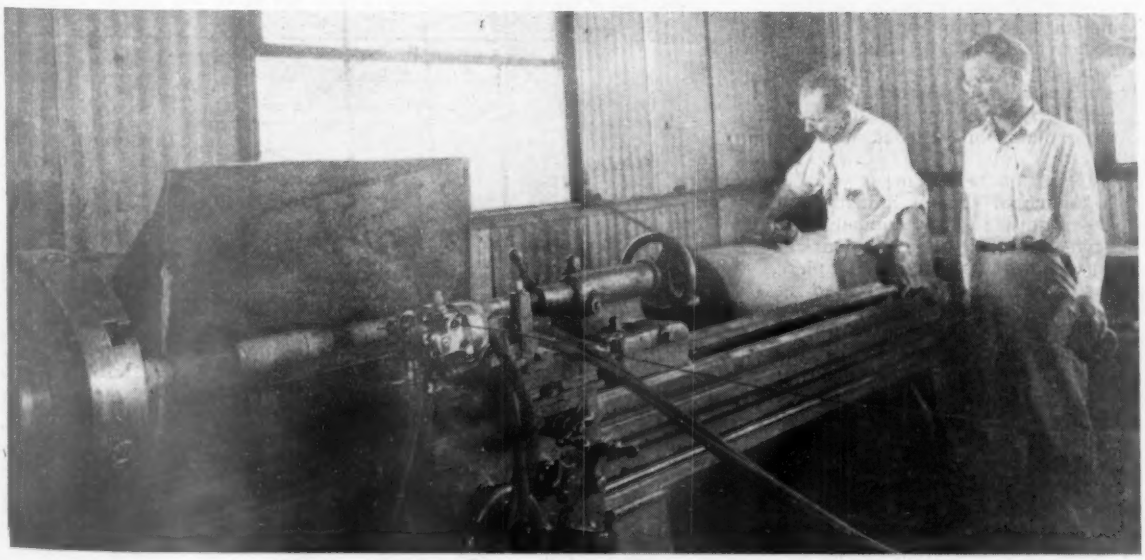
It is adapted for operation on any lathe in the shop. This grinder has been advantageous in work on plungers, valves, and seats as well as for finishing metallized shafts. There is no expansion of the mechanism to a point where it will lock or jam the wheel mandrel since it follows the expansion and contraction of the high-speed rotating parts

Index Head

The shop has developed a conventional compound index head for gear generation and indexing which facilitates marking a blank with the desired number of spacings.

At the shop a method has been developed for tinning to insure thorough bonding to various shell materials such as steel, cast iron, bronze, etc. Reused babbitt is improved by processing so that it is completely cleaned. Reused babbitt is only applied to bearings for certain kinds of service where it will be adequate to meet the bearing requirements. New babbitt is utilized in types of bearings where only the best material will be satisfactory. Careful grading and cleaning of babbitt make it possible to maintain high standards for these operations.

Working conditions during the handling of metallizing of shafts, etc., have been improved by equipment developed in the shop for removing fumes and metallic dust.



Metallizing equipment showing fume ejector

XUM

Texas Cycling Operations Increase 15 Fold During Past 7 Years

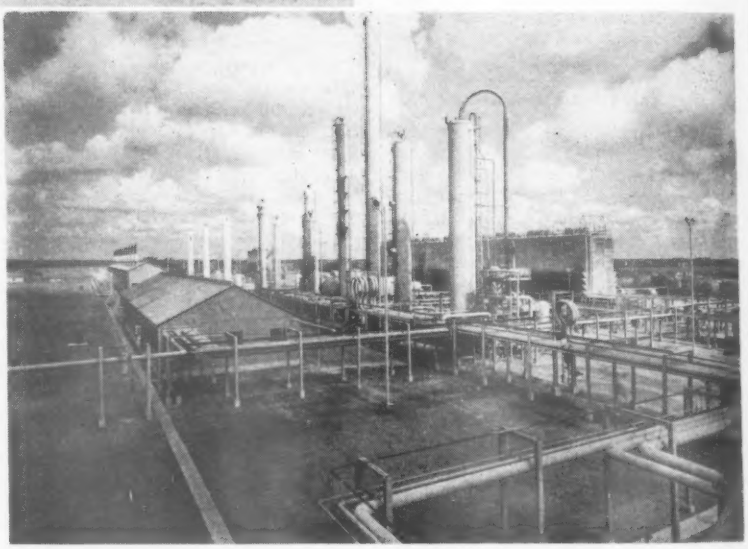
Seven years ago there were only two cycling plants in Texas. Today there are 30. The growth of this branch of the industry appears to be almost spontaneous.

by E. H. Short, Jr.

CYCLING is defined as a project which involves the processing of gas from condensate wells, with the subsequent return of the stripped or dry gas to the formation from which it was produced. In so far as the data presented in this article are concerned, cycling must not be confused with repressuring which concerns the return of gas to an oil-producing formation in which the original reservoir pressure has been practically exhausted, the wet gas therefrom being stripped in so-called casinghead-gasoline plants. Another distinction is the types of products turned out. Cycling plants, especially the most recently constructed plants, are equipped to turn out a large number of highly purified, finished products ranging from liquid propane to gas oil and including finished aviation gasoline, whereas the plants which process gas derived from repressuring operations are concerned largely with the manufacture of gasoline.

Fig. 1 shows the increase in Texas cycling plants operations from 2 in 1938 to a total of 30 during the early part of 1945. The growth of this branch of the oil industry appears to be almost spontaneous. The broken-line trend of rated plant capacity shows that individual plant capacity was greatly increased as knowledge of cycling operations progressed.

Despite the appearance of the chart the installation of the first true cycling plants for handling gas from condensate wells was preceded by several years of engineering investigation which, although rather slow, was extremely exhaustive in scope. The first step toward the compact streamlined cycling operations of today was the engineering discovery that liquefied components of gas-distillate gas were in the vapor



The two photographs above illustrate the progress made in cycling plants in 7 years. That at the top was completed in 1938; that above was recently finished

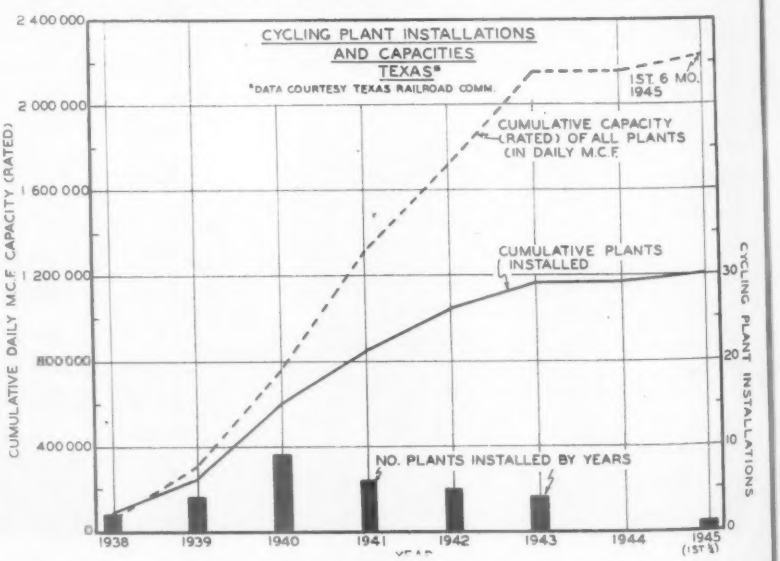


Fig. 1

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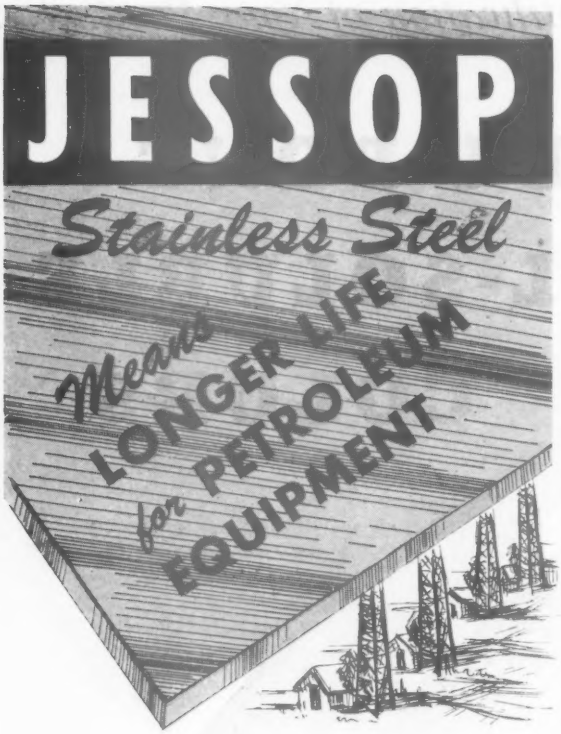

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The use of columbium as a stabilizer in Jessop 18-8 Cb, which is a chromium-nickel stainless, prevents the formation of chromium carbides at grain boundaries and thus makes this alloy ideally suited for welding.

Jessop 12 (Type 410)

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TYPICAL ANALYSIS

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Jessop 4/6 is particularly suitable for use in the Petroleum Industry in refinery equipment, particularly where sour crudes are encountered, a life of four to ten times that of mild steel is not uncommon. This alloy is suitable for use at elevated temperatures, and is more resistant to scaling and oxidation than is mild steel.

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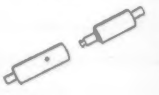

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phase in the reservoir. With the phenomenon of retrograde condensation now so widely understood, even by the average oil-field worker (who can intelligently discuss the single-phase state of gas under reservoir pressure and temperature) it is difficult to realize that during the early thirties engineers believed that the freak wells which produced a fair grade of gasoline were actually bottomed in a reservoir containing such a grade of crude in liquid form.

The final understanding and acceptance of the fundamental laws governing condensate sands while extremely important, represent the solution of only a small part of a complex problem which had to be worked out before cycling was to come into prominence. However, even before these condensate reservoirs were fully understood there was an attempt by several operators to recover from gas wells, a product which approached motor fuel. A plant for this purpose located in the Corpus Christi area was shut down by the Texas Railroad Commission. Condensate wells were considered gas wells by the state. There were a number of distillate fields in Texas during the early thirties such as Cayuga, Grapeland, La Blanca, and Agua Dulce, and operators and production derived from these fields were dependent upon a market for the dry gas. In reality, an order issued by the Railroad Commission in 1934 to the effect that stripped gas must be utilized as prescribed by law or returned to the formation from which it was produced, is responsible for a concentrated attack on the problem which ultimately led to the cycling projects of today.

Obviously the return of stripped gas, which in many instances would require as high as 3,000 psi., magnified the economic factor of the already complex problem facing the operations of shut-in distillate wells. It therefore became an accepted fact that any practical method employed in extracting hydrocarbons from condensate gas would have to be one which would lend itself to the processing of the gas under high pressures, which in turn would permit the return of the stripped gas to the formation with a minimum rise in pressure. Engineers, delegated with the responsibility of presenting a practical plan for stripping distillate production, after exhaustive experimentation found the pressure and temperature points at which maximum recovery of hydrocarbon was effected. A pressure reduction below these discovered points actually reduced the distillate condensation.

During these early days of intensive investigation the importance of pressure maintenance as a part of

Fig. 2—County listing of Texas cycling plants, shown in order of completion

TEXAS CYCLING PLANTS

Company, field and county—	Numerical order of plant comp.
Tide Water Associated-Seaboard, Cayuga, Anderson	1
Anco Gas Corp., Long Lake, Anderson	2
Aqua Dulce Co., Agua Dulce, Nueces	3
Roeser & Pendleton, Inc., Cayuga, Anderson	3
American Liberty Oil Co., Grapeland, Houston	4
H. M. Harrell, Bammel, Harris	5
Tide Water Associated-Seaboard, Long Lake, Anderson	6
American Liberty Oil Co., Blessing, Matagorda	6
Trinity Gas Corp., Long Lake, Anderson	7
L. M. Lockhart, Agua Dulce, Nueces	8
Tide Water Associated-Seaboard, Cayuga, Anderson	9
Lone Star Producing Co., Grapeland, Houston	9
Hunt Oil Co., Long Lake, Anderson	9
Gulf Plains Corp., Agua Dulce, Nueces	10
Gasoline Production Corp., Grapeland, Houston	11
Gulf States Recycling Co., San Salvador, Hidalgo	12
Stanolind Oil & Gas Co., La Rosa, Refugio	12
Chicago Corp., Stratton, Nueces	13
La Gloria Corp., La Gloria, Jim Wells	13
Geier-Jackson Recycling Co., Grapeland, Houston	14
Francitas Gas Co., Francitas, Jackson	15
Chicago Corp., Agua Dulce, Nueces	16
Lone Star Producing Co., Opelika, Henderson	16
Lone Star Producing Co., Willow Springs, Gregg	16
O. W. Killam, Joyce Richardson, Harris	17
Distillate Production Corp., North Houston, Harris	18
Humble Oil & Refining Co., Katy, Waller	19
Skinner & Eddy Corp., Tom Graham, Jim Wells	19
Superior Oil Co., Lake Creek, Montgomery	20
Trinity Gas Co., Sejita, Duval	21

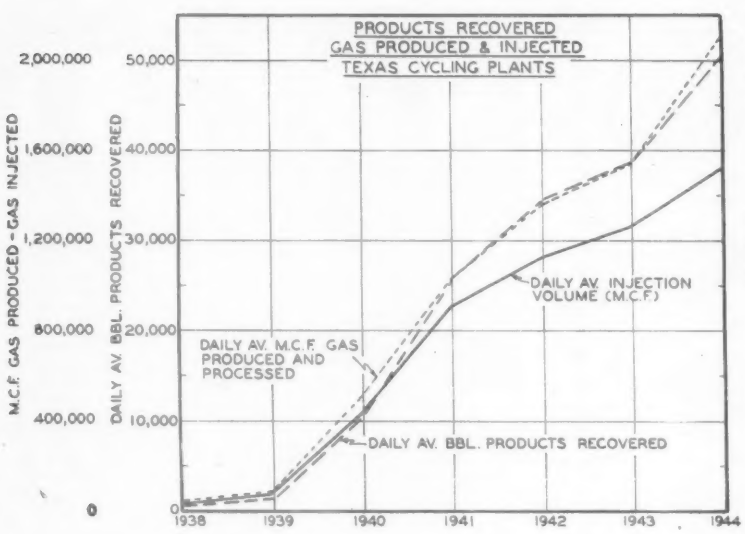


Fig. 3

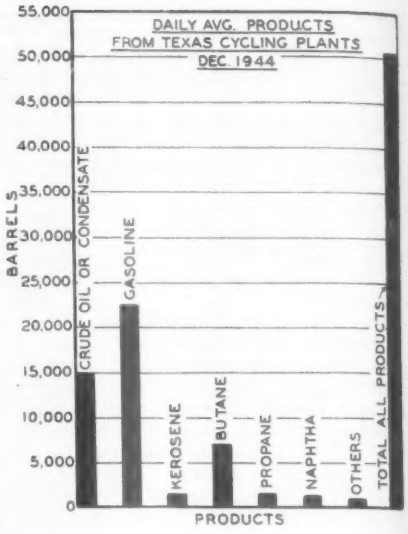


Fig. 4

cycling operation was recognized. Due to expansion and cooling of the gas as it is produced from a well some condensation takes place as soon as the gas enters the well bore. While some well condensation takes place in the most efficient present-day cycling operation, pressure maintenance minimizes the change from a gas to a liquid in the reservoir itself. The possibility of a substantial loss in reservoir reserves through inadequate pressure maintenance was also recognized at that time and reasoning along this line was on the premise that condensate thus formed in the reservoir would adhere to the otherwise dry sand grains.

A comparison between one of the first cycling plants installed and the type now being used illustrates the tremendous improvement which has been made in the short span of 5 or 6 years. One of the first cycling plants installed in 1939 was not capable of making a complete separation of distillates. In this particular installation a water-to-gas exchanger cooled the incoming gas to approximately 85°. The gas was then admitted to a separator where the pressure was reduced from around 1,850 to approximately 1,200 psi. This pressure reduction brought about an approximate drop in temperature of around 10° and raw distillate was trapped in another separator whose outlet tied into the intake header of the compressors. In order to inject the stripped gas into the wells the compressors were required to boost the pressure approximately 900 lb. or to 2,100 psi. The successive reductions in pressure were from 1,200 psi. to 500 to atmosphere.

The recently installed cycling plants are designed to completely utilize all of the lighter hydrocarbon contained in gas-distillate production, especially propane and butane.

In one of the up-to-the-minute cycling plants recently constructed by Hudson Engineering Co., gas is routed through atmospheric-type gas coolers before it enters the plant. The next step takes it through a pressure-reducing valve, thence to the absorber at approximately 80° F. and 1,700 psi. Condensate brought about through the reduction in pressure is removed from the gas at an inlet scrubber built integrally with the high-pressure absorber. This condensate goes through two intermediate-stage separators where a contamination of the absorption oil by the boiling constituents in the distillate is prevented by not permitting it to mix at any time with the rich absorption oil. Rich high-pressure absorption oil is reduced in pressure by means of two-stage separation and is then combined with rich reabsorber oil. The combined rich oils are pumped through a battery of heat exchangers into the still and rectifier, where they are stripped of absorbed hydrocarbon constituents.

Butane and lighter materials flow overhead from the first fractionating column with pentane and heavier constituents produced as bottoms. The butane is removed from the bottom and propane removed overhead after the overhead stream has been condensed and pumped into a depropanizer.

An example of the large number of products manufactured by the present-day cycling plant the following percentages are based upon actual production figures from the plant just described:

	Percentage of daily production
Aviation gasoline	52.9
Kerosene	12.9
Liquid propane	11.8
Normal butane	10.2
Isobutane	8.8
Gas oil	1.7
Mineral seal oil	1.7
	100.0

Referring to the development of

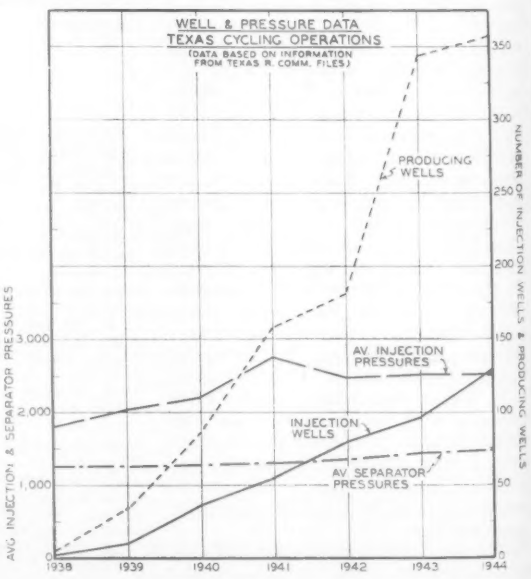


Fig. 5

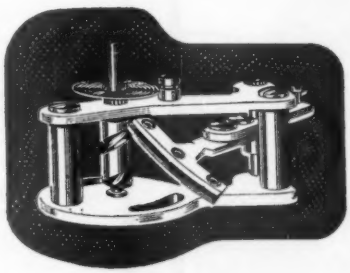
Texas cycling operation it will be noted from Fig. 1 that 1940 was the peak year for the installation of cycling plants. From this point on the curve tends to level out. However, it should be observed that the cumulative rated capacity of cycling plants constructed begins a straight-line ascent which did not begin leveling off until 1943. This, of course, indicates a substantial increase of individual plant capacity, which in turn means an increased recognition of the economic importance of cycling operations.

With the success of cycling operations so firmly established it may be difficult for some to believe that there could have been any possible doubt in the early day as to the economic success of this high-pressure hydrocarbon plant. However, considerable investigation was necessary to satisfy engineers concerning the effect of returning dry gas to a distillate reservoir. Some felt that there was a possibility that the dry gas might simply diffuse with the wet gas in the formation near the injection well instead of driving the wet gas ahead to the producing wells. A number of tests resulted in the accumulation of positive evidence which eliminated the disturbing possibility of diffusion. It should be mentioned, however, that recent tests indicate that the efficiency of sweeping out wet gas with dry gas is lower than originally indicated and N. C. McGowen, chairman of the gas well subcommittee, in April 1945 recommended that this situation be given very careful study.

Cycling, in its infancy, was rocked in two widely separated cradles. Early cycling operations were begun almost simultaneously in Anderson and Nueces counties, but at this time installations form an almost unbroken chain from the extreme lower coast well into the northern part of East Texas (Fig. 2). The wells feeding into these cycling plants range in depth from approximately 3,900 ft. in the Woodbine formation in Anderson County to a 9,700-ft. sand in the Lake Creek field located in Montgomery County.

Fig. 5, showing well and pressure data, gives an over-all idea of separation and injection pressures. From an average injection pressure of 1,800 psi. established in 1938, it has gradually climbed to approximately 2,500 psi. Naturally these pressures vary considerably from field to field. Two or three cycling projects have as low as 1,400 psi. injection pressures. The majority, however, are in the neighborhood of 3,000 psi. Perhaps the highest injection pressure is that in the Lake Creek field which runs about 4,000 psi. Separator pressures, which averaged 1,250 psi. in 1938, are now averaging 1,500 psi.

IT'S IN THE GROOVE!



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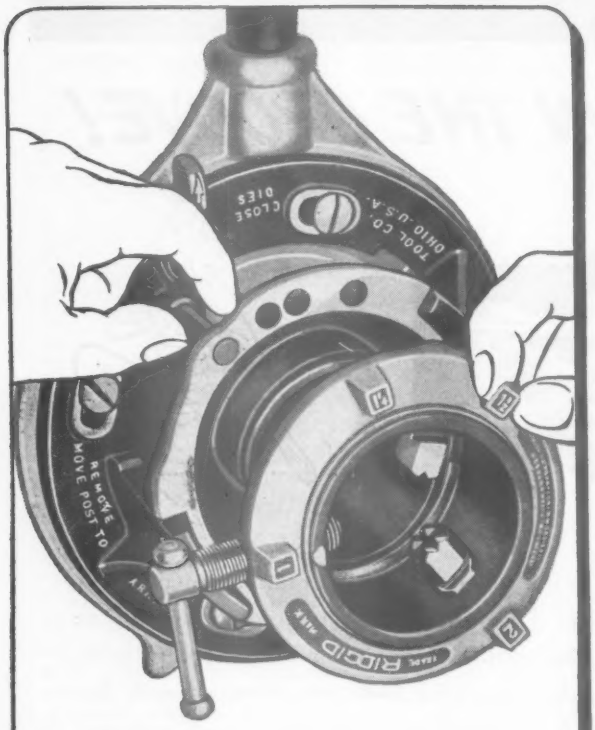

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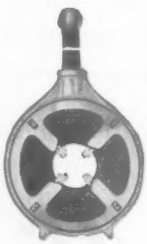

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Many plants are now running over the original rated capacity; however, as shown in Fig. 3, the actual quantity of gas processed by all plants is approximately the same as the combined rated capacities shown in Fig. 1. This chart also shows that the daily average products processed has increased from only 678 bbl. a day in 1938 to over 50,000 during the latter part of 1940. The average amount of gas which has to be processed to make 1 bbl. of liquid is shown below:

Year—	Gas in M.c.f. required to make a bbl of liquid
1938	50.5
1939	56.75
1940	47.6
1941	39.8
1942	38.0
1943	40.2
1944	42.5

It will be noted that the gas required to make a barrel of liquid declined from 50,500 cu. ft. in 1938 to a low of 38,000 cu. ft. in 1942. It would be mere speculation to assign causes for this drop. Increased efficiency of cycling plants appears to be one of the most logical reasons for the decline in the quantity of gas required to manufacture 1 bbl. of distillate. There has been almost a 12 per cent increase in the cubic feet per barrel from 1942 to 1944. It is possible that this may prove to be an indication of the diffusion of dry injection gas with the wet gas.

Extremely Low Rates

While 42,000 cu. ft. of gas per barrel of manufactured distillate is an average figure for all plants, some of the rich gas areas have an extremely low ratio.

As an example of low ratios, data pertaining to the Lake Creek gas-condensate field in Montgomery County are extremely enlightening. This is the richest known distillate field in Texas. The cumulative gas production from this field as of March 1945 is 15,767,180,000 cu. ft. From this gas was manufactured 2,453,502 bbl. of condensate. According to these figures the manufacture of 1 bbl. of condensate required only 6,430 cu. ft. This prolific field has 10 producing zones and the gas reserves in place are estimated at 450 billion cubic feet and the hydrocarbon liquid in the wet gas originally in the reservoir is estimated at 58 million barrels.

Grateful acknowledgment is made to Jack K. Baumel, director of production and chief engineer, Oil and Gas Division, Texas Railroad Commission, for information and data pertaining to cycling operations.

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Dr. Sidon Harris, formerly seismograph supervisor for Stanolind Oil & Gas Co. in its North Texas-New Mexico division, has been made president of Southern Geophysical Co., Fort Worth. Besides his 10 years with Stanolind, Dr. Harris was associated with Humble Oil & Refining Co. and Western Geophysical Co. for several years. He holds a Ph.D. in physics from University of Texas and was on the faculties of Rice Institute, University of Texas, and Oklahoma A. & M. College. **Paul H. Ledyard,** formerly associated with Stanolind, has been named seismograph supervisor of the new company.

John A. Ramsey has been made superintendent of Continental Oil Co.'s refinery in Wichita Falls, Tex., succeeding **D. H. Hyler,** who resigned. He had been superintendent of the company's refinery at Glenrock, Wyo., for the past 2 years. He is succeeded at Glenrock by **A. W. Taylor,** formerly assistant superintendent.

Eugene C. Anderson, formerly with International Minerals & Chemical Corp., at Carlsbad, N. M., has been named director of the New Mexico Bureau of Mines and Mineral Resources at Socorro. He succeeds **A. D. Hahn,** who resigned to enter business. Anderson was chief engineer of the Pecos River mine of the American Metals Co. for 12 years and then chief engineer at the Carlsbad potash properties of International Minerals & Chemical Corp. He goes to Socorro from Drummond, Mont., where he was manager of International's phosphate division.

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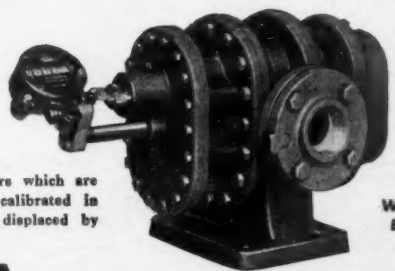

WRITE FOR BULLETIN 40-B-15

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MODERN
Rotary Drilling Machinery
AND PRACTICES

Part 7—Looking Ahead

by W. S. Crake

In this installment, the seventh and final of a series of articles by the assistant chief mechanical engineer, Shell Oil Co., Inc., Houston, a glance into the future is hazarded. Several items of equipment are discussed as to probable advancements that will be made in them. The entire series, which began in the issue of June 30, should help the operator to analyze any new ideas for drilling use with better perspective.

ANY attempt to make positive statements regarding the long-term outlook for drilling equipment and methods would be rash in the extreme. To those, however, charged with the responsibility of planning the design, or assembly, of drilling equipment, it is essential that some peering be done into the "crystal ball."

From the simplest standpoint, the operator can look at today's drilling methods and, for deep drilling, plan on larger, more flexible and more efficient equipment. For shallow to medium drilling, plans for lighter and more mobile and flexible equipment can be made.

The above method is one which is not in itself sufficient for the long-term analyst, the dreamer, or the progressive operator to follow. Any technically trained student of today's subsurface drilling methods can see how elementary and crude they are. As is natural, because of the tangible nature of the surface equipment and its performance, far more ingenuity and work have been applied to improvement of the physical means of performing today's drilling than to the fundamental problem—which is the method used below the ground.

The rig is the servant of the bit, because all the expenditure involved at the surface of the ground, and down to the bit, is for the sole purpose of operating the bit and, as a relatively minor duty, the various exploratory tools which are used to determine the nature and contents of the formations penetrated. Since the invention of the rock bit, there has been no fundamental advance in the range of drilling tools. The contributions of metallurgy have been mainly responsible for the advance since that time.

Deep, hard drilling today is, in the broad sense, becoming prohibitive in cost and major reductions are essential to permit of development of deep reserves without increasing the cost of petroleum products to the consumer, or making development of a high proportion of reserves impractical. The problem of shallow and medium drilling in soft and medium-hard formation territory is fairly well in hand, but hard rock and deep drilling needs vast improvement.

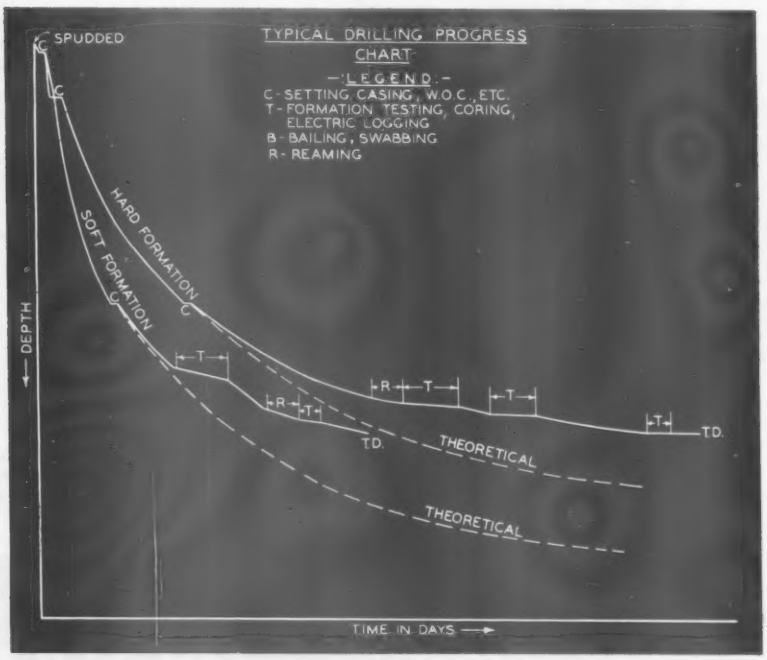

Fig. 1

The Hoist

In order to look ahead it can be assumed with relative certainty that a hoist and derrick will be necessary, regardless of the type of drilling operation or the method used for drilling the well.

The designer and operator are, if the hoist is assumed not to be complicated with functions other than hoisting, confronted with the necessity of achieving the best possible portability and simplicity which can be combined to do the job. The economy of a deep-drilling hoist is far more a matter of its low maintenance and long life than its first cost.

The ton-mileage of work required of the hoist is the measure of the ruggedness and strength which must be built into it. A 3,600-ft. soft-formation well demands about 500 ton

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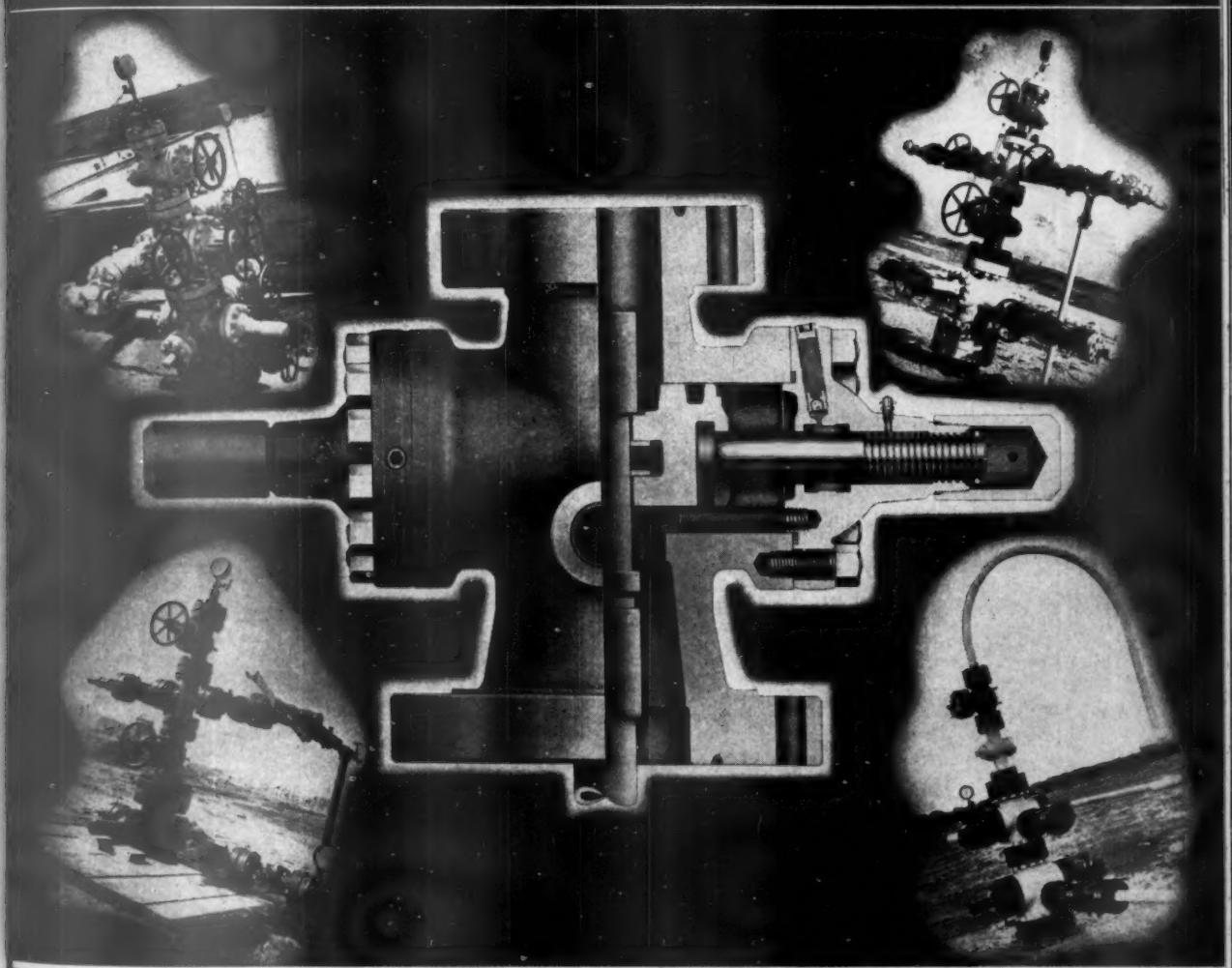

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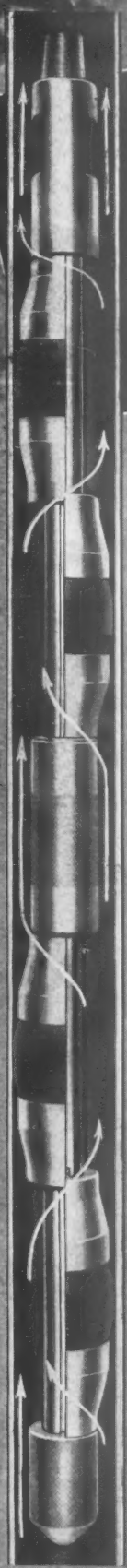

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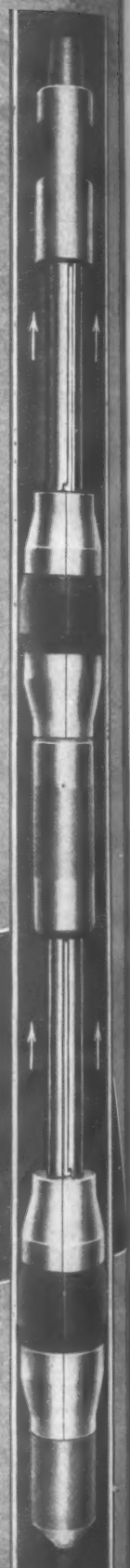

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miles of service from the hoist, a soft-to-medium formation 7,000-ft. well requires 7,000 ton miles, an 11,000-ft. hard-rock well about 35,000 ton miles and an 18,000-ft. hard-rock well is estimated to require the output of 100,000 ton miles. The reader can thus see how maintenance costs can mount on equipment which is loaded too heavily for deep work and how heavy hoist design may well hinge around the wire-line consumption cost. Hoists may thus need to be designed with wire-rope drums of sufficient size to carry the hoisting cable in one wrap, for long life and service. Loads of up to 200 tons of drill pipe and 350 tons of casing can be expected to be handled by the hoist in the near future.

The industry is already to the point of requiring 1½-in. wire lines for the next step ahead, and hoists for ultra-deep drilling may well look to the mine hoist and the wire-rope service obtained on single-line pulls on these hoists. This service runs from 10 to 20 times that obtained on rotary drilling—although admittedly on closely controlled loading and high safety factors.

Since the derrick and blocks, hoists, etc., are all part of the hoisting system, ultra-deep wells, involving from 300 to 600 round trips per well, will justify tall derricks for pulling drill pipe in 120 or 135-ft. stands—the latter in 45-ft. drill-pipe lengths. This should reduce wear and tear on hoist clutches, gears, etc., and also reduce hoisting times considerably.

Derricks of 34 to 38-ft. square floor, 7 to 8-ft. top opening and about 180 ft. high will be necessary for such work, to accommodate the large rope sheaves and number of pipe stands to be racked therein.

The above picture is partially an extension of today's drilling methods. Any developments in bits of methods which would reduce the ton-mileage requirements or number of round trips per well to any considerable extent, would reduce the hoisting problem in proportion.

Fig. 1 shows typical drilling progress charts on a depth-time scale for deep wells. Shallower wells would tend to be typical of the shallower portions of this chart. The chart clearly shows the necessity of improvement in performance at the lower end of the well and also the need for improved and accelerated methods of exploratory testing, so as to evaluate the formations more rapidly. It should be noticed that drilling rate in deep "medium-formation" wells, which is shown by the slope of the drilling-progress curve, tends to become about equal to that in hard-formation wells at extreme depths.

Pipe Handling

On deep wells, round trips with conventional tools, involving heavy physical exertion on the part of all the crew for 120 or more stands, are fatiguing in the extreme and tend to promote accidents, either to personnel or equipment, towards the end of a long trip. Development of automatic slips and tongs, pilot-controlled hoists, mechanical assistance to the derrickman, taller derricks, involving fewer stands to break, will all contribute to the reducing of crew fatigue and thus faster round trips, fewer wasted hours and reduced drilling cost.

No changes in the general procedure used in a round trip are advisable because of the minor possibilities of saving time and the prime safety requirement that the pipe should always be under the direct control of the driller.

Mud Pumping

Little increase in the efficiency of surface pumping equipment itself can be expected. Increases in the size of units, moves towards elimination of pressure losses in the mud circuit, and improvements in the flexibility and efficiency of drives on power rigs, can be expected.

Motive Power

Efforts to increase the efficiency and flexibility of power generation and delivery to the hook will continue. Considerable thought is being given to this problem and the possible improved use of high-efficiency steam plants, steam-electric, internal combustion-direct, hydraulic or electric drives. "Packaged power plants" have been highly developed for war purposes and may be applicable at least to marine drilling. High-efficiency steam plants must overcome the problem of combination fuels of varying types, poor quality of makeup water, low load factors, continuous zero-to-full-load power impulses, and lack of portability.

The future also holds promise for the gas-turbine-electric rig after this turbine has proven satisfactory in heavy industrial applications for some considerable time.

The immediate future for deep drilling seems to point towards the internal-combustion engine — d.c. electric rig as the most promising and easily applicable to all drilling territories unless free fuel and good water are available, in which case conventional steam rig will be satisfactory.

Operators are generally aware of the fact that power plants and complex machines of any high-efficiency type are necessarily efficient by reason of addition of extra features, automatic controls, switch gear, precision transmissions, etc. An ultra-heavy drilling rig may involve a power plant of 2,000 hp., which is big enough to supply a city of several thousand inhabitants. The rig may represent an investment of $400,000 or more. It is, therefore, easy to see that extra labor in the way of specialized operators or mechanics will be just as important to the economical operation of such a rig as the drilling-crew members. It is virtually impossible to expect the driller to be an expert consultant in all the mechanical, thermal, and electrical details of heavy-rig operation and still have time to drill. The deeper the well becomes, the more valuable the driller becomes to his employer when he concentrates on the problem of achieving maximum footage from his bits, drill pipe, etc., and keeps constant watch on well behavior.

Bits

Ability of the bit to make hole

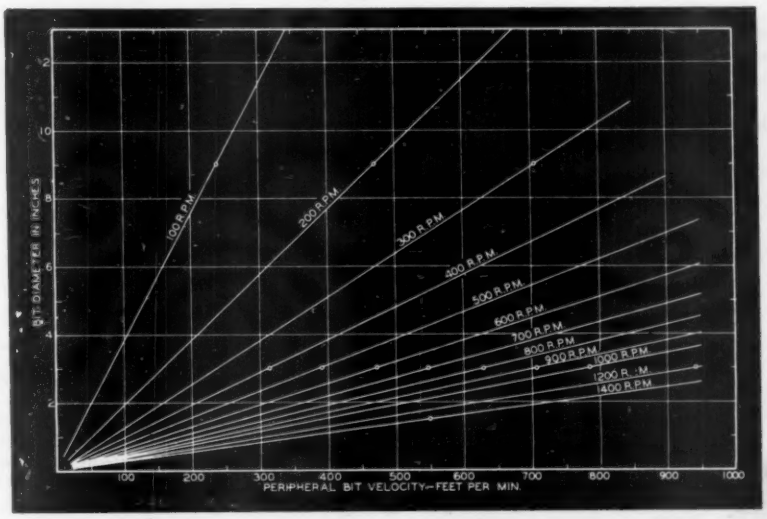

Fig. 2

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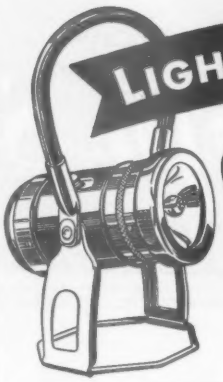

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actually determines the over-all rig performance.

In another article, the two main types of bits available were listed as the scraper or blade type, and the crushing or rock-bit type.

The rock bit was further described as a semipercussion type of bit, the percussion action being caused by passing of rock-bit teeth over center as the cones rotate and thus causing slight raising and lowering of the bit.

Percussion-type bits were used many years ago on rotary drilling and operated by raising and lowering the drill string to operate the bit. This was not successful. A full-percussion-type bit has decided advantages over other types in brittle formations and many attempts have been made to develop means of employing the percussion principle by the use of hydraulic, piston-operated tools, cam-operated tools, etc. So far these ideas have not produced a practical and proven tool. Even if the bit-actuating mechanism can be made durable and simple, the bits themselves may present quite a problem in metallurgy, cleaning, and cooling. The greatest single improvement attendant to a successful percussion bit would be the elimination of drill-pipe rotation or use of very slow rotation. Tremendous operating savings would thus result even if the bits themselves drilled only as well as present rock bits. In addition, since little weight would be used on the bits, holes should tend to be drilled true to the vertical.

Diamond bits have exceptional possibilities of improving hard-drilling results. These bits return to the scraper or blade principle and the results obtained in mining prospecting lead the oil operator toward the belief that a great improvement in oil-well-bit performance could be obtained by proper application of these in the oil fields. The problems, again, boil down to cooling and tooth cleaning, but there is no reason to doubt success, if sufficient effort is spent in working out the problems. Considerable experimentation is now under way in the field.

Advantages offered by diamond bits are lowered circulation requirements, long bit life, and rapid penetration rates. Rotational speeds will depend partly on hole diameters, but indications are that speeds within present-day operating range can be successful.

The chief disadvantage of diamonds is their susceptibility to damage on impact and their use will demand bit precision feed and weight control, even more so than for any other type of bit.

Rock bits, using different principles of tooth construction, ranges of operating speeds and weights may give far better operating results. New hard metals, grouping of teeth and blade groupings offer the possibility of improving the blade-type bit.

To the advocates of high-speed rotation for drilling, it should be remembered that the periphery of the bit is usually the point of maximum wear. Fig. 2 shows peripheral velocities of bits of various diameters at various r.p.m. With any type of bit, the effect of this velocity on the bit performance is an important factor and must be considered when designing the bit and choosing the bit r.p.m.

For economy, drilling methods should aim towards lower drill-pipe r.p.m. to reduce drill-pipe troubles, and lower circulation rates to reduce drill-pipe and rig size and lower operating cost. Methods are discussed as distinct from bits since it is assumed that bits of most types would be usable under several methods. Methods which do not require drill-pipe rotation, or which use slow rotation as an "antisticking" precaution, include the turbo drill, the bottom-hole percussion drill, and possibly, the bottom-hole electric-motor drill.

The turbo drill is an old idea and,

while it has achieved some measure of success, insufficient data are available to evaluate this tool properly at this time. Its inherent trouble is the necessity of building small-diameter multistage turbines and using mud containing abrasives as the operating medium. The turbo drill has the advantage of requiring no drill-pipe rotation, since the reaction of the bit tends to drive the drill pipe counter-clockwise and keep the joints tight. Provided wall friction is not excessive, the back torque on the pipe can be measured and recorded as the bit torque. Available modern remote-operating instruments can also be used to give the bit r.p.m. The turbo drill requires high circulating fluid volume and medium pressure drop (600 to 800 lb. across the turbine), or vice versa, both of which are undesirable because of the high cost of pumping mud, especially on deep wells. The turbine, being small in diameter, must also be long in order to develop the power required for operating the bit.

Unfortunately, the small-diameter turbine itself is a relatively low-efficiency device and the drilling hydraulic circuit is even lower in this respect. The combination of the two low efficiencies would tend to give very high power costs per foot of hole drilled.

The possibilities of the device are, however, extremely interesting and, if it can be developed successfully for shallow drilling in sizes of 6, 7, and 8-in. diameter, the evaluation of drill pipe and other savings will determine whether high-cost pumping plants will be justifiable for deep wells.

Subsurface electric motors involve major problems in the transmission of power down the drill pipe and, unless some revolutionary new development in cables and handling occurs, the method seems to offer small possibility of success. All drilling definitely requires the circulating pipe string for removing cuttings and for cleaning and changing the mud fluid to prevent blowouts, and for cooling the bit. No known electric-cable-operated drilling device could be used, therefore, unless large-diameter hollow cable can be developed.

Drill Pipe

The future of drill pipe is largely involved in metallurgy and intelligent use. With present methods, less than 250 revolutions of the pipe are made per foot drilled in shallow soft formations, about 750 revolutions per foot in drilling to 7,000 ft. in the Gulf Coast, and up to 1,500 revolutions per foot drilled in 11,000-ft. rock drilling. On ultra-hard formations, such as chert, up to 6,000 revolutions per foot drilled are needed. These figures indicate the fatigue effects on drill pipe used on deep wells with present methods. Unfortunately, high ductility characteristics, required for good drill-pipe steel, generally become harder to obtain on high-strength steel and the steel maker's task of providing material for low operating cost and safe drilling at extreme depth becomes harder.

The use of tapered drilling strings, either in sizes, weights or grades, thus using the steel best suited in the proper portion of the well, may become necessary to overcome the above problem. This will be troublesome and tend to cause mistakes and should be avoided, if possible.

The effect of low r.p.m., or of no drilling r.p.m., will be highly beneficial to the drill pipe and high r.p.m. will tend to be destructive in the extreme because of the high stresses in the hanging pipe and the unavoidable fatigue effects, which are a reflection of stress and number of revolutions made.

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drilling information obtained on new formations and at greater depths is extremely important to the operator. Only by studying and working out the drilling problems to an economical solution can the operator, in many instances, afford to develop reserves after their discovery. This becomes truer as the depth increases, but also has many examples in low-yield fields of normal depths.

For this reason, proper and accurate instruments and records are needed for study by technical personnel, and the highest quality of operating personnel is specially necessary on deep drilling. Errors of judgment or action on the part of the operating crews can be increasingly expensive as wells become deeper.

As previously suggested, one major flaw in today's drilling method is the lack of uniform control over the action of the bit. The bit manufacturers are therefore forced, by practical need, to design bits for use over the widest types of rough usage. New construction principles and methods, and new materials can cause great increases in bit performance if they are used under reasonably fixed conditions. The successful development of any improved drilling method, regardless of type, probably hinges on obtaining control of the bit performance.

Whenever automatic controls have been correctly applied in industry, they have resulted in an improved product at less cost and often have been the only factor which has enabled the product to become commercial.

The problem of building, applying, and operating proper automatic controls is a long-term project for the drilling industry but bit manufacturers will undoubtedly react to the new possibilities for design which will open up when this problem is worked out.

Summary and Conclusions

These articles have been written mainly with reference to applications of equipment to today's drilling methods. The greatest problems of selection and use of available equipment occur when the requirements are at or about the capacity limit of one class or type of equipment. An attempt has been made to outline those factors concerning surface and subsurface equipment which must be considered by the user before making his selection.

Most complete rig assemblies have a limited range of economical drilling depth and the operator can neither afford to overload or underload equipment continuously to any appreciable extent.

From a study of the figures given, especially the rate of increase of loading as depth increases, it can

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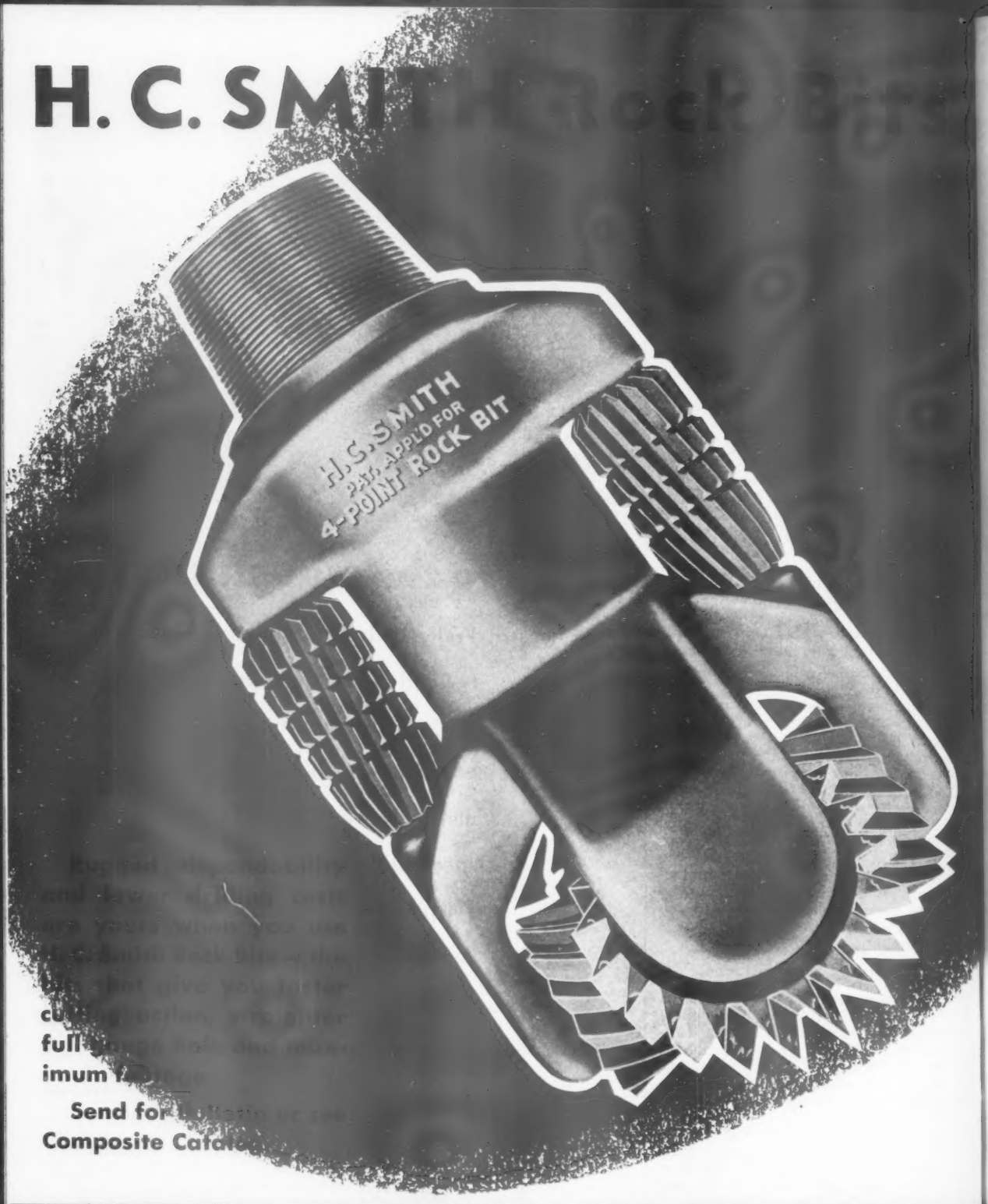

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be seen that far more caution and judgment must be exercised by the operator in purchasing machinery, and loading it within its true capacity for deep drilling than is necessary for shallow drilling work.

In view of the broad advances in portability of all types of equipment during the war, the drilling industry can expect to be offered innumerable items of new equipment and new applications of older equipment after the war. It is hoped that the information contained in this series of articles will help the operator to analyze any new ideas for drilling use with better perspective.

In general, the suggestion is made to open up those bottlenecks which now exist in drilling rigs, cause inefficiency and consequent high operating costs. High efficiency and poor performance are, however, almost as bad a combination as high performance and low efficiency. Most good operators correctly aim at obtaining high drilling performance as the primary target and mechanical efficiency, or operating cost, as the secondary target.

Conclusions to be drawn are:

1. The development and improvement of surface equipment for oil-well drilling has proceeded at a far more rapid pace than the development of subsurface technique and equipment.

2. Low hydraulic efficiencies and consequent high operating costs are due, in many instances, to the use of too small drill-pipe sizes and, in some instances, to too high and wasteful circulation rates.

3. The bit and its use being the key to drilling costs, more concentration on its proper use in the field, and subsequent improvements in its design in the manufacturing plant, will reduce drilling costs.

4. Study and control of drilling variables are necessary to know what affects bit performance. Automatic control of the weight or feed rates of the bit is a necessary step in this direction.

5. The most important energy and effort of the drilling industry should be concentrated on improved control methods, drilling methods, and bit design. Surface machinery sizes needed, and operating costs, depend entirely on these factors.

Acknowledgments

The author wishes to thank all those individuals who have assisted in the preparation of these articles by giving their help, suggestions, and criticism, without which the value of the articles would have been materially less. Acknowledgment is also made to Shell Oil Co., Inc., for its permission to publish this series of articles and for its cooperation and assistance in making available some of the illustrative charts included.

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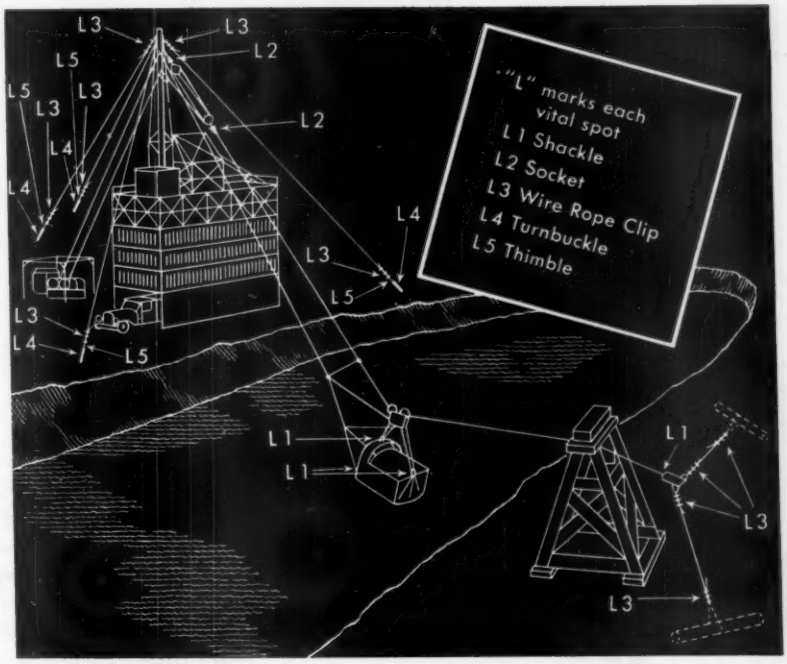

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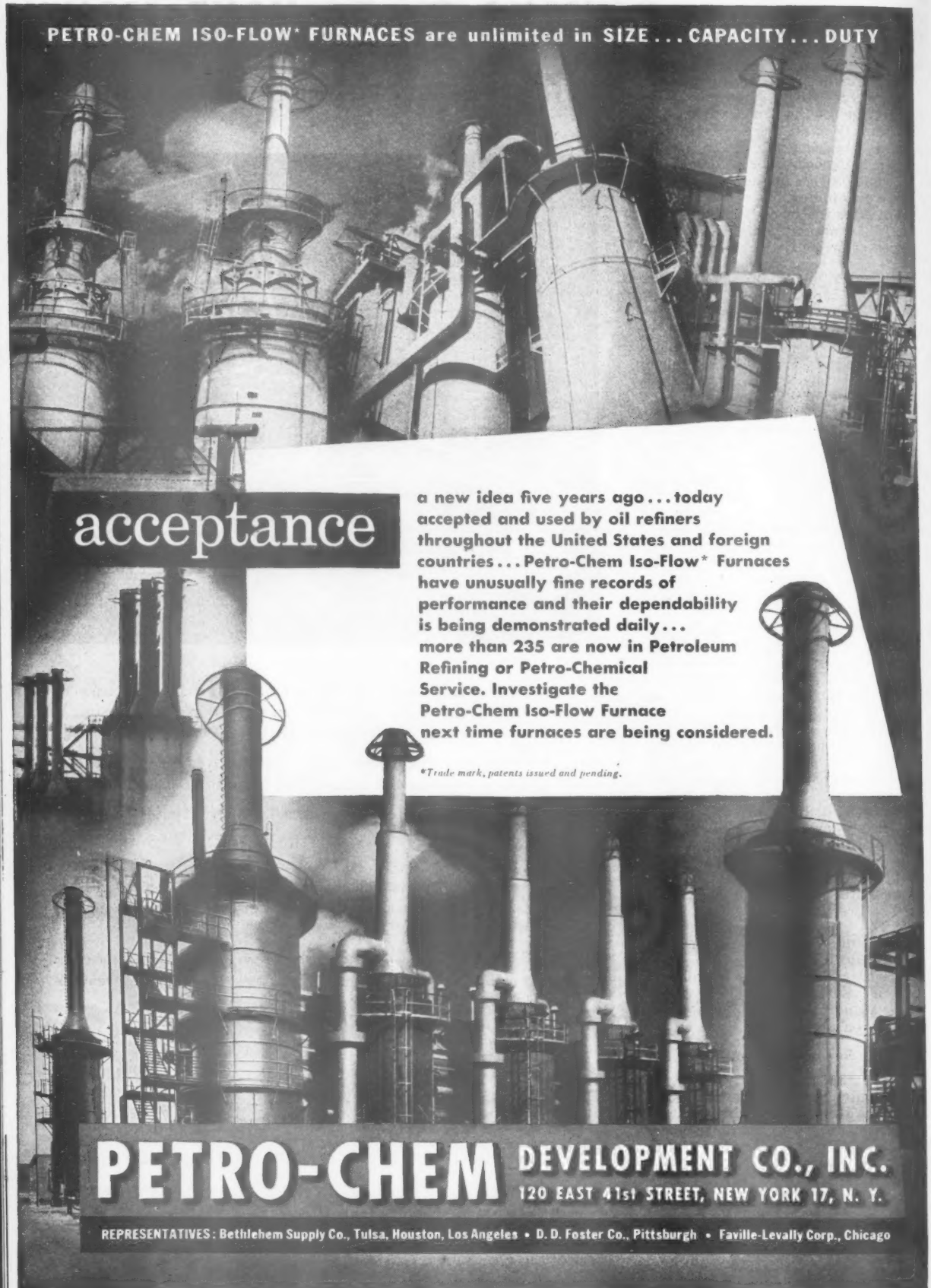
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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Venting of Tanks in a Fire

We note your item of June 9, 1945, about the heating of tanks by a fire. How can we tell if the vent valves on a butane tank are adequately large?—J. M. C.

Such a question can be the source of great controversy. It involves many factors such as:

1. Rate of heat input.
2. Amount of surface exposed to heat.
3. Whether or not tank is full of liquid.
4. Properties of the fluid in the tank.
5. Kind and type of vent valves.

Rate of heat input.—This situation has been discussed on the Questions on Technology page (95) in the issue of June 9, 1945. In summary, the maximum rates of heat absorption (B.t.u. per sq. ft. per bbl.) based on whole tank surface are about as follows:

Small containers—intense fire	32,000
Large high-pressure containers	24,000
Atmospheric pressure storage:	
Small	20,000
7,000 bbl.	5,000
Large	2,000

Surface exposed to heat. — Obviously a tank completely surrounded by flame will be heated more rapidly and will require more venting than one which is exposed to the same intensity of heat but on only part of its surface. This is evident in the tabulation just above.

Liquid or vapor?—Generally, the volume of gas produced from a nearly pure liquid at its boiling point, such as liquid butanes, is greater than for any other situation. The gas vented from a small tank of a gaseous material may also be large but usually not as great as that for a boiling liquid. Finally, the increase in volume caused by the heating of wide-boiling-range liquids, such as crude oils, or liquids such as gas oil which are stored at temperatures far below their boiling point, is very small and may consist mainly of the small increases in volume that a liquid undergoes when it is heated.

Obviously, there are numerous different situations that may arise and hence only one illustration can be given here. Consider a 30-ft. tank of butane of diameter of about 4 ft., which is exposed to heat at the rate of 20,000 B.t.u. per sq. ft. per hour. The position of the flames is such that 300 sq. ft. of the tank surface is heated at the average rate of 20,000 B.t.u. The heat input is:

$$20{,}000 \times 300 = 6{,}000{,}000 \text{ B.t.u. per hr.}$$

After the contents of the tank have been heated to its boiling point (about 160° F. at 125 lb.), the entire heat input will go into vaporization of the butane. Under these conditions the latent heat of vaporization of butane is about 130° and hence the pounds vaporized per hour would be approximately:

$$6{,}000{,}000 \div 130 = 46{,}000 \text{ lb. per hr.}$$

The volume of this amount of butane at 60° F. and 14.7 lb., would be about:

$$\frac{46{,}000}{58} \times 379 = 300{,}000 \text{ cu. ft. per hr.}$$

$$\text{or} = 833 \text{ cu. ft. per sec}$$

This would be the required capacity of the vents (measured at standard conditions) for this special situation.

Size of vent line.—The answer to this cannot really be given except for a very particular situation with respect to kind of material, pressure, temperature, type of vent valve, design of the particular valve, etc. The answer should not be attempted here but the excellent discussion by Duggan, Gilmour & Fisher (Venting of Tanks Exposed to Fire) Quarterly of the National Fire Protection Association, page 132, October 1943, Part 1, can be examined.

Loss in Gravity of Crude Oil During Storage

Will you inform me what are the losses in gravity per year for East Texas crude oils kept in storage tanks? If this has appeared in The Oil and Gas Journal please send me copies.—C.C.

There is no reason to expect that tank losses will be different for East Texas crude oil from other average crude oils, and accordingly, the losses will be somewhat as follows:

	—% lost (approx.)— Breathing /year	Per filling
Kind of roof—		
Gas-tight fixed	1.1 -1.5	0.05
Wiggins breather	0.2 -0.7	0.05
Wiggins pontoon	0.25-0.4	none

Somewhat larger losses are probably encountered in many ill-kept storage tanks.

Computations indicate that a decrease of 1° A.P.I. involves the loss of 1.5 to 4 per cent of crude oil. The lower figure is for newly produced crude oil which loses mainly dissolved gases such as propane and butane, whereas the higher figure is for weathered oils that are losing mainly gasoline.

On the basis of these figures the yearly decrease in A.P.I. gravity could range from less than 0.1° to as high as 1.4° depending upon storage conditions. The general condition in the East Texas field indicates that the loss in A.P.I. gravity per year probably does not exceed 0.7°.

Gravity Below 10 A.P.I.

What is meant by an A.P.I. gravity less than 10° A.P.I.? I hear of 4° A.P.I. and 8° A.P.I. cracked residuums and do not know what to make of them.—A. J. V.

Although Baume gravity and the A.P.I. gravity patterned after it, should not properly be used for gravities less than 10°, they are regularly used in this improper manner. For this reason (the widespread misuse) it is probably legitimate to use A.P.I. gravities to values below 10°.

According to established practice there are two Baume scales, one for liquids lighter than water (A.P.I. gravity is similar) and the other for liquids heavier than water. The latter scale or hydrometer, i.e., liquids heavier than water, is widely used by the industry for sulfuric acid (note 66° Be. acid) and caustic soda solutions (note 15° Be. caustic) but it is doubted if the heavier-than-water scale is used by anyone in describing asphalts or very heavy petroleum oils.

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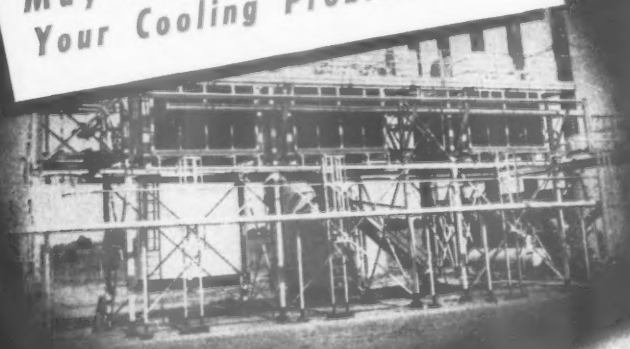

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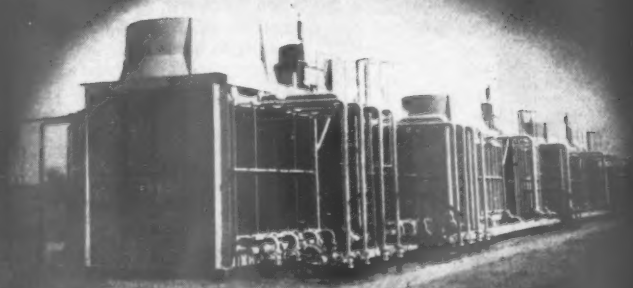

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OXIDATION OF PARAFFINS

by Dr. Ernest Stossel

PART II

Six thousand tons of synthetic edible fats was fed to German soldiers in World War 1, it is reported; also large amounts of soaps made from synthetic fatty acids were supplied to the German people during that time. Catalysts play an important part in paraffin oxidation reactions. Certain types of oxidation inhibitors naturally occurring in the paraffins may be converted to oxidation activators by suitable treatment. Control of the reaction must be close and exact in order to make high yields of the desired products.

AS part of its preparation for this war the German Government sponsored the industrial exploitation of the synthesis of fatty acids for the manufacture of edible and industrial fats and much research work had to be done in this direction. Finally[4,5,9] the most important German oil and soap factories and the chemical trust I.G. pooled their patents and experiences and cooperated closely in order to make the German fat and soap industry self-sufficient and independent of oversea imports in case of war. A very appropriate raw material was found in the slack wax obtained as byproduct of the Fischer - Tropsch process of synthesis[20,43,45,49,50] of gasoline, lubricating and fuel oil from coal available in Germany in great quantities. Thus, it became really possible to synthesize industrially edible fats and soaps from coal. It was also discussed in a previous article[10] that this process cannot compete economically with crude oils from wells, but as the synthetic gasoline was an essential part of the German war effort and half of the German oil economy had to rely upon synthetic oil before and until crude-oil producing territory could be conquered, the manufacturing cost was of no importance.

The making of soaps from petroleum was not new and "soap from petroleum" was presented as a curiosity at the exhibition in Paris in 1873. In the last world war a soap substitute was sold in Germany under the name of "Providol-Soap" which showed at least better foaming and washing qualities than the then mostly used KV-soap, prepared from clay. A kind of substitute for edible oils was also manufactured, according to Burwell's report, by esterifying alcohol with acids "formed by ozonolysis of hydrocarbons". About 6,000 tons have reportedly been fed to German soldiers. The oxidation of hydrocarbons actually is carried out in Germany on a very large scale to produce fatty acids[2,6,8] for edible fats and for manufacturing soaps, for which purpose it was found that normal carboxylic acids of from 10 to 20 carbon atoms are the most appropriate raw material. As raw material for the production of mainly this range of fatty acids normal, saturated solid paraffins with a chain length of from 20 to 30 carbon atoms are more suitable than unsaturated, side-chain or cyclo-aliphatic hydrocarbons. It was found that isoparaffins are converted by oxidation to a much higher degree to low-molecular-weight carboxylic acids and oxyacids. Cyclo-aliphatic hydrocarbons are converted to naphthenic acids of objectionable odor. But not until it was learned to control the condition of the oxidation [1,12,13,14,15,21,22,24,30,34,37,41] and to use a plentiful raw material like the Fischer-Tropsch slack wax or a similar cheap raw material (refined paraffin wax cannot be used for economic reasons) could the technical synthesis of fats for edible purposes and for soap manufacturing be made workable. Although little is known about the German industry in the last few years, some data are available to give a basic picture of this process. As raw material the fraction containing paraffins of from 20 to 30 carbon atoms corresponding to an average molecular weight of about 300 to 350, is generally used for the production of higher fatty acids for soap manufacture. Wietzel[8] reports that about 400,000 tons of technical fats are used annually in Germany, 70 per cent of which are used for soaps and that the synthetic fatty acids are supposed to substitute for natural fats in a great part of the latter, at least.

Jantzen, Rheinheimer, and Asche[5] give an analysis of a Fischer-Tropsch slack wax used as raw material for oxidation:

$C_{16}H_{34}$ to $C_{19}H_{40}$	27.4%
$C_{20}H_{42}$ to $C_{22}H_{46}$	31%
$C_{23}H_{48}$ to $C_{25}H_{52}$	23.6%
$C_{26}H_{54}$ to $C_{28}H_{58}$	13.3%

Portions of this mixture are hydrocarbons which are liquid at ordinary temperature, but only saturated hydrocarbons are present. The melting point of this mixture is reported to be 100° to 105° F.

H. Pardun[7] studied the influence of the amount of air upon oxidation of paraffinic hydrocarbons. In order to determine the optimal amount of air for the oxidation of aliphatic hydrocarbons to acids in liquid phase, Fischer-Tropsch slack wax was oxidized at temperatures from 100° to 160° C. with 0.5 to 1 liter of air per hour until an acid value of 50 was obtained. At each temperature the rate of oxidation rises until a limit value is reached then remains constant. The velocity of oxidation increases with increasing amount of air per hour up to a limit where it remains constant. The optimal "D" values found for each temperature are in a logarithmic proportion to the temperature. The applicable equation is

$$\text{Log } D = at - b.$$

where D = liters of air per gram of substrate per hour, a and b are constants, a = 0.03, b = 4.3 for optimal oxidation rapidity and 4.6 for maximum yield of acids. t = degrees C. The temperature coefficient is practically constant at 2.52 in the limits from 110° to 140° B., but above this temperature falls to 1.80-1.70. This shows that the oxidation at higher temperatures (than 140° C.) takes a different course as at the optimal temperature of 110° to 140° C.

In order to study the dependence of yield of fatty acids upon the stage of oxidation of aliphatic hydrocarbons, Pardun oxidized Fischer-Tropsch slack wax in an apparatus at a constant temperature and with a uniform current of air. In a series of experiments 600 l. of air per hour were blown through 6 kg. of slack wax for 1 to 9 hours in the presence of 30 g. of manganese stearate as catalyst and at temperatures of from 100° to 160° C. At different stages of oxidation (when the acid numbers were 20, 40, 60, 80, etc.) 40-g. portions were removed and analyzed for unsaponifiable, fatty acide, hydroxyacids, etc. From these data and from yields of nonvolatile oxidation products obtained in blank runs, interpolation formulas were derived which could be used to calculate the course of oxidation for practical purposes and especially to determine the most favorable stage of oxidation. The

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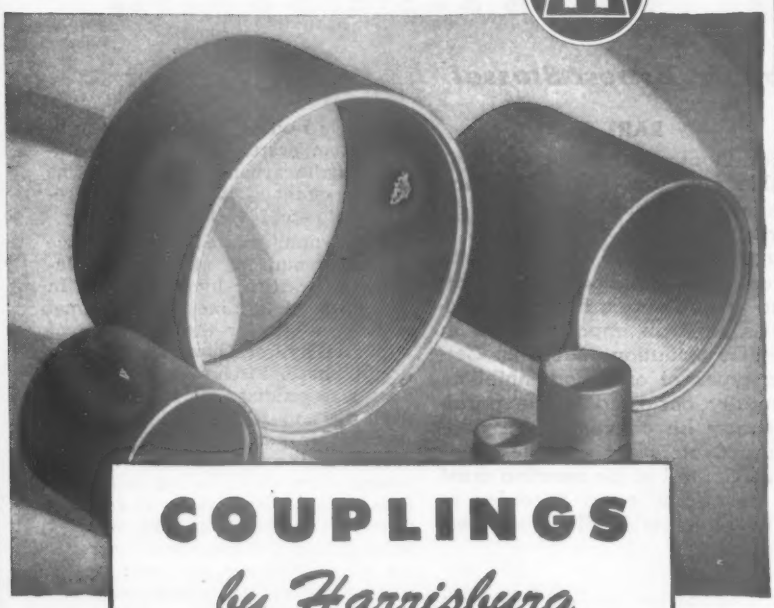

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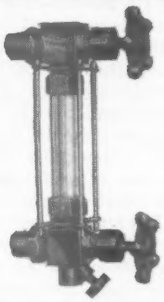

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authors claim that the figures obtained in the laboratory were in good accordance with results observed in the plant.

Varmalov investigated the oxidation of paraffin wax under pressure and found that the rate of oxidation was directly proportional to the pressure applied. It was pointed out above that one cause for the failure of earlier oxidation processes is the fact that partly oxidized compounds react more easily with oxygen than do the original hydrocarbons and that each oxidation step proceeds with less difficulty than the preceding one. It is therefore of great importance for successful operation to avoid oxidation of the reaction products of the oxidation to too great an extent[19 22 33 44 45]. By controlling two main conditions in the oxidation process overoxidation can be avoided largely and the formation of oxyacids and polymerized products be decreased. (1) The oxidation must be interrupted before the whole paraffin is oxidized. (2) The temperature of the oxidation must be kept as low as possible. The curves in Figs. 1 to 4 (published in Angewandte Chemie, vol. 51, page 532[3]) show the influence of these two conditions upon the formation of substances insoluble in petroleum ether - oxyacids and polymerized products.

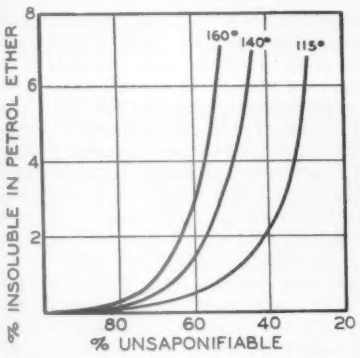

Fig. 1: Influence of temperature and stage of oxidation upon the formation of substances insoluble in petroleum ether in the crude acids

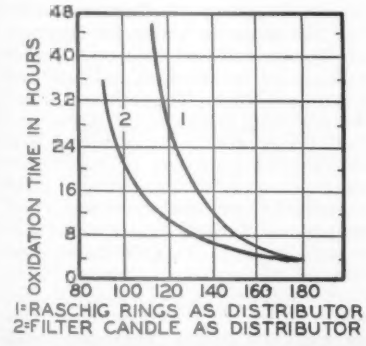

Fig. 2: Comparative experiments on the influence of the distribution of air (Curve 1 shows: Raschig rings as air distributor. Curve 2 shows: Filtercandles as air distributor)

As may be seen from Fig. 2 the distribution of air through the liquid is also of great importance. The selection of catalysts[24 34 39] plays an important role in furthering the process at low temperature by shortening the time of reaction and controlling the course of the oxidation, especially in decreasing formation of oxy-acids and reducing overoxidation of reaction products. Increased temperature affects unfavorably the color of the oxidation products while at relatively low temperature very light-colored products may be obtained. The temperature during the oxidation may be kept still lower when the hydrocarbons to be oxidized are previously heated[28 40] for several hours with alkali manganates at temperatures up to 200° C. It is claimed that the oxidation then proceeds smoothly at temperatures below 80° C.

The oxidation can be conducted as a continuous process in towers built of aluminum or acid-resisting steel or lined with silver or nickel chromium alloys, which is not attacked by the acidic reaction products of the oxidation.

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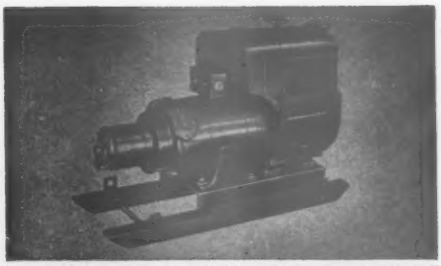

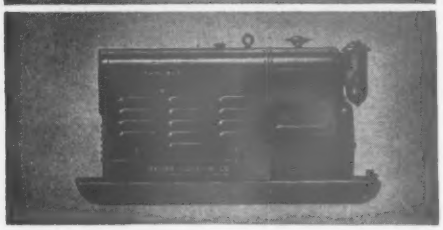

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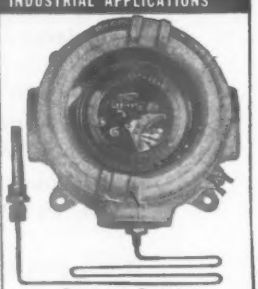

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large glass fibers, 0.008 in. in diameter, arranged in jackstraw fashion, ranging from 135 sq. ft./cu. ft. to 232 sq. ft./cu. ft. of surface area. Other air diffusion systems which produce maximum fineness of air bubbles with greatest contact volume of diffusion, or turbomixers may be used effectively.

As oxidation is an exothermic process the temperature must be controlled carefully, e.g., in control chambers. (Fig. 3) and is kept higher in the first reaction chamber and successively reduced in the following. At a pressure of from 4-6 atmospheres and at a temperature of 100° to 110° C. a reaction time of from 10 to 20 hours is reported by Wietzel. The oxidation is interrupted at an early stage in order to increase the ratio of higher-molecular-weight fatty acids to lower acids in the yield. When an acid number of about 50 is reached the reaction product is pumped into a tank and treated with steam and water in order to separate water-soluble constituents, then saponified under pressure in batches or in a continuous process. Continuous alkali saponification processes[11 14 15 16 20 21 28] were introduced in the United States more than 10 years ago, notably by Ittner. The fats are thoroughly emulsified with NaOH or Na_2CO_3 solution and are then passed under pressure through a small bore reaction tube part of which is maintained at a temperature of about 300° C. The actual period of saponification of the material at this temperature is only 30 seconds. (Hilditch, "Fats and Waxes.") The process of saponification may be combined also with a continuous distillation of the non-acidic reaction products and unattached paraffins by injecting steam or in vacuo, and soaps containing only a very small percentage of unsaponifiable materials remaining as distillation residue in the anhydrous stage may be converted directly into commercial soaps or soap powders. The unsaponifiable portion may be separated also from acidic materials by a continuous distillation process but the acids in the crude product are first converted into an aqueous mixture of magnesium, calcium and potassium soaps. This mixture, after dehydrating, is subjected to distillation under reduced pressure while introducing saturated or superheated steam and/or inert gases. Mixtures[21] of 7 per cent calcium, 7 per cent potassium and 36 per cent magnesium soaps in the anhydrous state and 50 per cent of unsaponifiable have a melting point of about 80° C., while anhydrous sodium soap can be only difficultly kept liquid at close to 300° C., at which temperature the neutral products have to be distilled off. When distilling a soap mixture as described the distillation materials remain liquid during the

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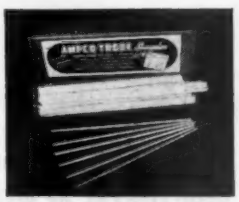

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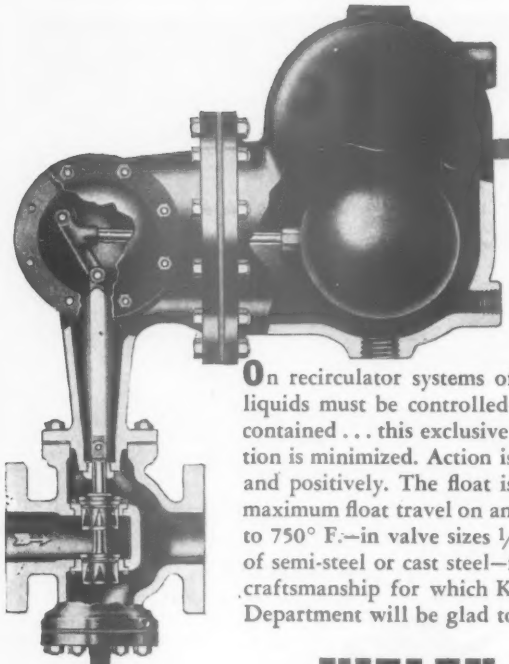

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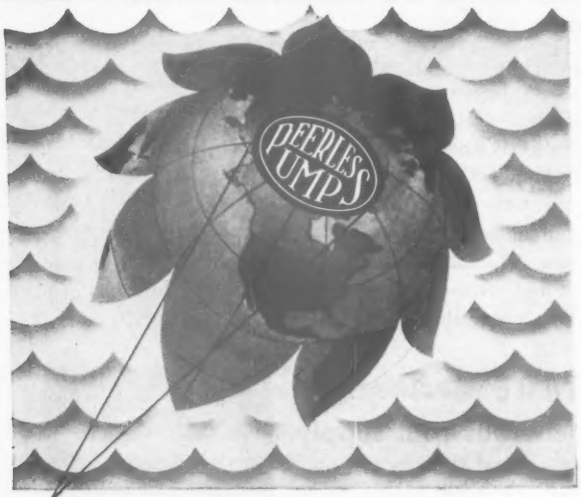

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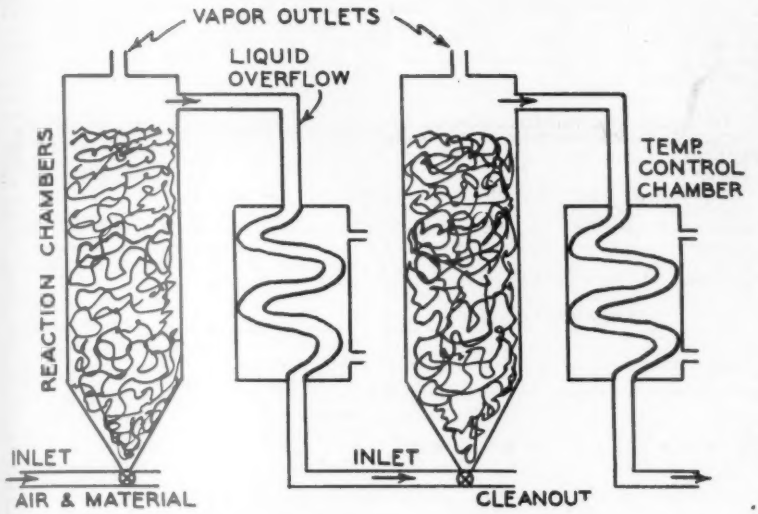

Fig. 3[35]: An apparatus as described and pictured in USP 2,015,347 where the air enters from the bottom simultaneously with the material to be oxidized and passes from top of the reaction vessel into the lower part of a second reaction vessel

whole period of treatment and any local overheating can be avoided easily. However[15 20 27 38 39 47], these difficulties have been overcome and the continuous process of saponification and separation of unsaponifiable material by distillation seem to be the safest method of separation. The extraction of the soaps with solvents which was used earlier will be used in the future probably only for small-scale manufacturing. At the high temperature of saponification the fatty acids are simultaneously deodorized and purified and the content of oxyacids reduced by splitting off of a molecule of water. Acids obtained by the decomposition of these soaps by dilute mineral acid, when subjected to vacuum distillation with steam give a good distillate, white soaps, odorless with free lathering properties, making lasting suds.

The distillate from the separation of unsaponifiable matter from soaps containing neutral oxidation products and unattacked paraffin may be returned to the reaction vessel for further oxidation to fatty acids. The separation of other oxidized products from hydrocarbons after the separation of the acids and other processes will be described in the third article of this series.

The crude fatty acids after they have been liberated from their soaps by mineral acid are distilled with steam in vacuo and separated into at least three fractions in order to concentrate the acids most useful for the soap manufacture.

The first fraction contains acids up to C_9 in a yield of approximately 20 to 25 per cent of the total yield of acids and shows an acid number of 435, saponification number of 440, hydroxyl value of 3, carbonyl number of 6, iodine number, 8.

Jantzen and Rheinheimer[5] give a very detailed analysis of the fatty acids obtained in the oxidation of Fischer-Tropsch slack wax (analysis on page 13). The oxidation product was saponified, repeatedly extracted with petroleum ether, the acids liberated from their soaps, the oxyacids separated together with polymerized products by treating the crude acids with petroleum ether and the purified acids fractionated by steam distillation in vacuo. After the water soluble acids have been removed by washing with water the distillate showed an acid value of

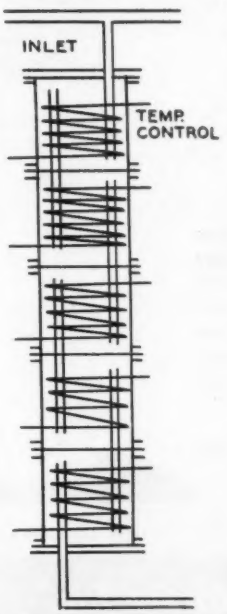

Fig. 4[35]: Tower as described and pictured in USP 1,990,229 where the material to be oxidized enters from the top of the tower

261.8, corresponding to an average number was 8.85. The acids were converted into their methyl esters, the esters redistilled and fractionated and the fractions saponified to the free acids. The acids were identified by boiling points, melting points, melting points of their mixtures with known substances, and by analysis.

molecular weight of 214.3; the iodine

From the crude fatty acids about one-third distilled up to 175° C. at 11 mm. of Hg vacuum; saponification number 329, acid number 314.

The fatty acids are mainly normal carboxylic acids containing only a small amount of unsaturated acids and contain approximately the same amount of acids of even and odd carbon atoms:

		Per cent
Up to C_7		7
Caprylic C_8		4.25
Pelargonic C_9		5.70
Capric C_{10}		7.40
Undecanoic C_{11}		6.20
Lauric C_{12}		7.65
Tridecanoic acid C_{13}	M.P.41°C.	8.30
Myristic acid C_{14}	M.P.54°C.	6.75
Pentadecanoic C_{15}	M.P.53°C.	9.00
Palmitic C_{16}	M.P.62°C.	6.70
Heptadecanoic C_{17}	M.P.61°C.	6.25
Stearic C_{18}	M.P.69°C.	4.25
Above C_{18}		18.20

In the residue arachidic and lignoceric acids have been identified also. After separation of the lower acids the softening point was 26.2° C., the iodine number 4.86, hydroxyl number 4.86, acid number 244.2.

The middle fraction containing from capric to stearic acids, C_{10} to C_{18}, is the suitable raw material for the soap industry and the production of synthetic fats by esterification of these acids with glycerine.

As well for the first fraction as for the residual fraction, however, very valuable uses have been worked out which will be discussed in the next article. Mixtures of these fatty acids show approximately the same physical characteristics as the corresponding fractions produced from natural fats which found manifold uses in the paper, leather, textile, wire, paint and other industries.

In the synthesis of fatty acids by oxidation of paraffin, the oxidation step proper or the "blowing with air" as it was known for more than half a century, represents only the first step. Control of conditions such as maintenance of low temperature, right choice of raw materials, and combination of catalysts, interruption of the oxidation before secondary reactions predominate as well as methods for separation of the individual classes at different oxidation stages and subsequent purification are important factors in making oxidation of paraffins an industrially successful process.

Editor's Note: A third and final installment of Dr. Stossel's discussion of paraffin oxidation will be published in a subsequent issue. The bibliography for all three parts will be published with the final installment.

BOOKS

THERMODYNAMIC PROPERTIES OF AIR. By Joseph H. Keenan and Joseph Kaye. Published by John Wiley & Sons, Inc., New York. 77 pp. $2.25.

The need for a working table of the thermodynamic properties of air has been emphasized recently by the rapidly growing interest in the gas turbine. The compression of atmospheric air which occurs in a gas turbine can be computed with reasonable convenience without the aid of a table. Computation of certain other processes, however—such as the heating of air in a regenerator or the expansion of air and similar gases from states of high temperature—involve laborious integrations if tabulated properties are not available. This volume comprises 13 modern working tables for the ready computation of thermodynamic processes for air and gases, and includes problems and a bibliography.

TRAINING FOR SUPERVISION IN INDUSTRY. By George H. Fern. Published by McGraw-Hill Book Co., New York. 188 pp. $2.

The author, director of the Michigan State Board of Control for Vocational Education, has produced an understandable treatment for those concerned with the problems of training men for supervisory positions in industry. The work contains much that also will help the supervisor with his own program of upgrading and self-improvement, or with his training program. It also explains the conference method and recommends it for accomplishing training, and deals specifically with such supervisory problems as maintaining mental health in industry, handling prolems of women workers, promoting safety, training new workers, and disciplinary problems. The book does not attempt to present an all-inclusive or exhaustive treatise on supervision. It is not concerned with the history or the development of the supervisory function in industry nor with the technical and economic phases of supervision. Rather, it is intended to give direct help to the supervisor with the problems of his daily job, especially in the fields of human relations and training.

PIPING HANDBOOK. By Sabin Crocker. Published by McGraw-Hill Book Co., New York. 1376 pp. $7.

This is the fourth edition of this volume. The author is senior engineer, Engineering division, The Detroit Edison Co. The book makes available to the engineer, designer, and contractor a vast compilation of data necessary to the effective use of piping in all its engineering and plant applications—steam and power-plant piping, heating and plumbing systems, oil and gas piping—everything from water distribution to hydraulic systems for airplanes. The book authoritatively covers scientific fundamentals, materials, and design and installation practice, and gives many useful and dependable construction details, cost analyses, dimensional standards, material specifications, definitions, charts, and formulas. In this latest edition, the scope of the handbook has been extended to include chapters on "Gas Piping," "Refrigeration Piping," "Hydraulic Power Transmission Piping," and "Corrosion," which also covers the subject of protective coatings. In addition to this the chapter on "Water-Supply Piping" has been considerably augmented, and supplementary material of interest to hydraulic engineers has been added in the section on "Flow Water in Pipes," which now includes the Scobey, Williams-Hazen, and Kutter-Manning formulas.

THE VISMETER, MODEL A. By Carl D. Miller. Printed by The Andover Press, Andover, Mass. 24 pp. $1.

This brochure describes the Vismeter, Model A, which provides for the continuous sampling of a fluid and the continuous indication of its viscosity. Ordinarily it is provided with a manometer for the measurement of kinematic viscosity, with scale divisions extending from zero to a height of 25 cm.

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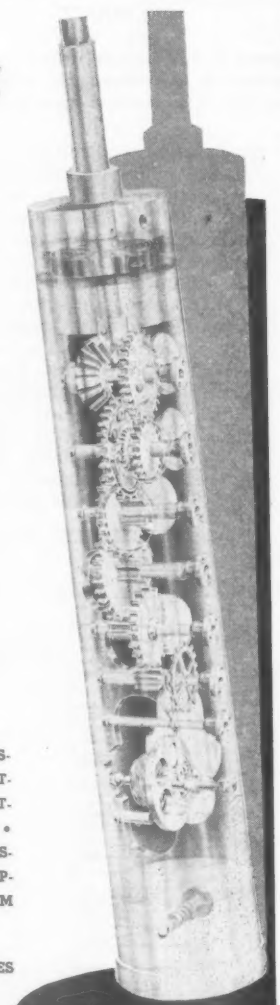

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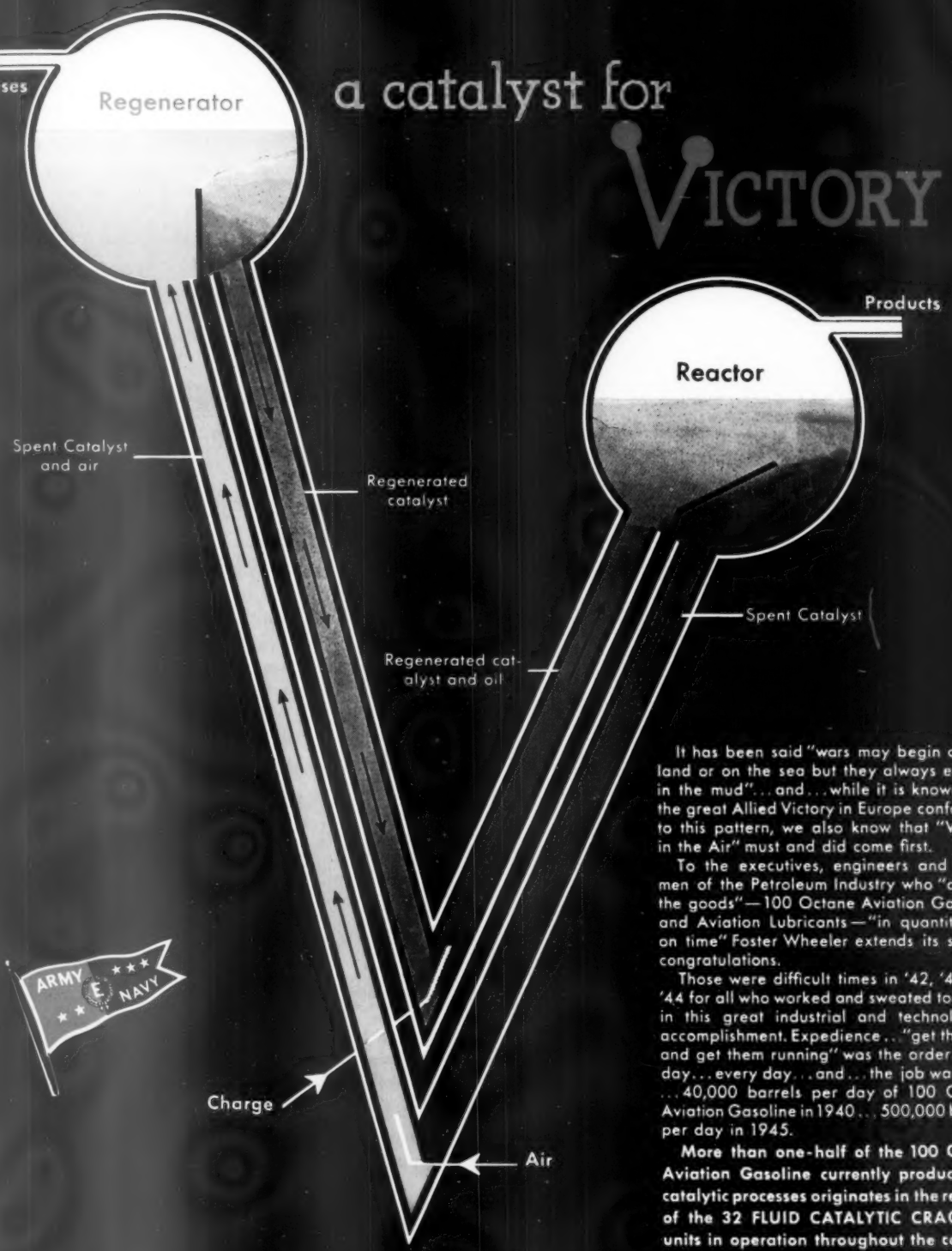

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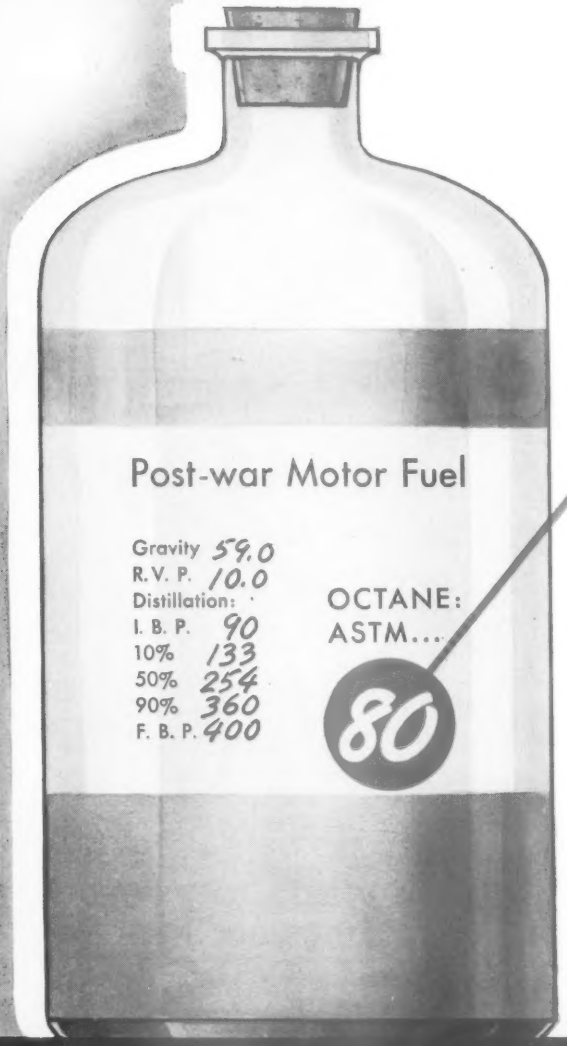

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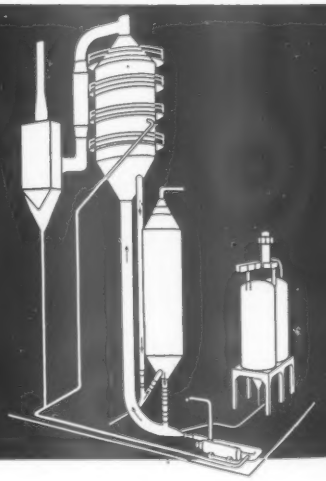

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Side Reflux

SIDE reflux may be defined as the use of reflux (or cooling agent) at points below the top of the tower. Hot liquid is drawn from the side of the tower, and it is pumped back in at one or two trays higher in the tower. It has two main advantages; it somewhat reduces the diameter of tower required, and it is better for heat exchange than top reflux because of its high temperature.

Smaller tower.—The use of side reflux keeps reflux vapor from traveling to the top of the tower. Thus, the top of the tower (above the side-reflux plate) can be smaller, or conversely more material can be handled through the tower. The advantage is not as great as it may first seem because the amount of reflux that must be handled in the lower part of the tower is not changed at all by the use of side reflux. In a topping tower the increase in capacity is about:

	Per cent
Top reflux alone	0
Top reflux and kerosene reflux	4
Top reflux and distillate reflux	14

Somewhat greater increases in capacity can be obtained by overloading the lower part of the tower but this gives a poor separation between the lower side-draw products. Likewise, the top product is not as well fractionated when side reflux is employed because the reflux ratio at the top of the tower decreases.

Heat exchange. — Although the amount of reflux heat that can be removed from the side of a tower is always less than the amount of heat that can be removed at the top of the tower, the side reflux is at a higher temperature and is therefore very effective in heat exchangers, reboilers, etc. Side reflux is seldom used for exchanger purposes in topping plants because the amount of heat available is relatively small, but in cracking plants it is almost universal practice to use side reflux for the heating of reboilers, etc. In many such plants the reboiler oil is withdrawn at 500°-550° F. and the amount of side-reflux heat may constitute 75-85 per cent of the heat removed from the tower.

Computation of side reflux.—The removal of too much heat from the side of a tower results in dry plates above the side-reflux plate and hence the amount of heat that can be removed from the side of the tower (defined as side-reflux heat) must always be computed. As a further factor of safety to take care of fluctuations in the operation of the tower, it is customary to remove only 90 per cent or less of the allowable side-reflux heat. In following the computations reference should be made to Notebook No. 45, June 9 (Tower Heat Balances) No. 46, June 16 (Types of Reflux), No. 48, June 30 (Tower Temperatures), and No. 50, July 14 (Tower Capacity).

Side-reflux heat is computed by making a heat balance up to the side-reflux plate. This is computed in exactly the same manner as the heat balance given in Notebook No. 48 on Tower Temperatures. The example given there is for the distillate plate of a 4,000-bbl. per day topping plant, and the heat balance consists of the following items: (1) cool gas and gasoline to distillate plate temperature as vapors; (2) cool each of the other products that are produced at points higher in the tower to the distillate plate temperature, i.e., naphtha, kerosene, and distillate; (3) condense the distillate, and (4) cool the topped crude to its withdrawal temperature (and possibly heat or cool steam). The sum of these items (Notebook No. 48) is 2,404,000 B.t.u. per hour.

In removing 90 per cent of the side-reflux heat by cooling distillate from 581° F. (distillate plate temperature) to say 300° F., the allowable recirculation of side reflux is:

$$\frac{0.9 \times 2{,}404{,}000}{(581\text{-}300)0.67} = 11{,}500 \text{ lb./hr.}$$

The 0.67 is the specific heat of liquid 37.5 A.P.I. distillate between 581° and 300° F. (Notebook No. 40, May 5).

$$\text{or } \frac{11{,}500}{6.97 \times 60} = 27.4 \text{ g.p.m.}$$

When cooling the side reflux to other temperatures the amounts are:

Cooled to	G.p.m
400° F.	40.7
300	27.4
200	21.2
100	17.6

The biggest load on the tower always occurs at the main reflux plate and hence the diameter will be computed at the distillate plate by use of the chart in Notebook No. 50 on Tower Capacity. The amount of internal reflux at the distillate plate is (92 is latent heat —see Notebook No. 43, May 26)—

$$\frac{2{,}404{,}000}{92} = 26{,}100 \text{ lb./hr.}$$

This amount of internal reflux must be handled at the distillate plate regardless of how much or what kind of external reflux is employed. The density of the vapor may be computed from the data of Notebook Nos. 48 and 47:

	Mols	Lb.
Steam	95.5	1,720
Gas	8.2	245
Aviation gasoline	54.1	4,980
Naphtha	50.6	7,230
Internal reflux	107.0	26,100
	315.4	40,275

The volume at 5 psig. (19.9 psia.) and 581° F. (1,041° R.) is—

$$V = \frac{nRT}{P} = \frac{315.4 \times 10.73 \times 1{,}041}{19.7}$$

$$= 179{,}000 \text{ cu. ft./hr.}$$

and the density is—

$$= \frac{40{,}275}{179{,}000} = .225$$

According to Notebook No. 50 the diameter (22-in. tray spacing) is 5.7 ft., whereas without side reflux the diameter had to be 6.2 ft. (Notebook No. 50).

No. 55 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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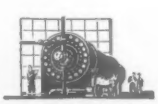


Process Equipment of All Kinds

Pressure Vessels and Other Welded Equipment

Aerocoach Motor Coaches

Precooling Service for Fruits and Vegetables

A FEATURE OF THE OIL AND GAS JOURNAL

Measuring Salt-Water Flow Rate

RATE of flow of salt water into floc-settling pits and water-disposal reservoirs is an important feature of water-disposal practice. It is necessary to know the amount of water in order to calculate the amount of chemicals needed in treating water. It is important to know the flow-through time in order to ascertain if sufficient time is allowed for proper settling of floc. It is also necessary to measure water volumes handled per day in order to figure disposal costs per barrel of water.

Methods of measuring rate of flow of water.—Several types of water meters are on the market which may be installed in salt-water flow lines that record the volume of flow in barrels. Certain models are subject to corrosion in salt water and rather short life unless constructed of noncorrosive materials. When noncorrosive meters are obtainable, they are the most satisfactory for continuous metering of water. Where only daily observations are necessary or where rate of flow merely from pit to pit or into disposal reservoirs only is needed or where water does not pass through pipes, the use of weirs is a cheap, satisfactory method of measuring salt-water flow.

Construction and use of weirs.—A weir consists of a constriction in a water flow line of definite size and shape so constructed that the head or height of water flowing through it can be easily measured. Commonest type of weir is a water-tight concrete or wood dam in the flow stream, having a notch made from thin noncorrosive metal installed in the constriction through which the water flows (Fig. 1). Often the notch is one in the shape of a 90° angle, but a 60° angular notch or a rectangular shaped constriction may be used (Fig. 2). When the water-tight constriction and notch have been installed, then all that has to be done to determine the rate of flow of water is to measure the head of water (i.e. depth) flowing through the weir and calculate the rate of flow by a simple formula. The measurement of head is best accomplished by using a measure constructed in the shape of a square and divided into feet, tenths, and hundredths of a foot. The short arm of the square is set vertical in the point of maximum water height flowing over the weir and the long arm leveled by means of a spirit level. The measurement is facilitated by setting a stake 18 in. upstream above the weir at such a height that when the square is placed on the stake and in the notch of the weir its upper edge will be exactly level and its shorter arm exactly perpendicular (Fig. 3). Height of the water flowing through the notches is measured, and the rate of flow of the water is calculated from the following formulas:

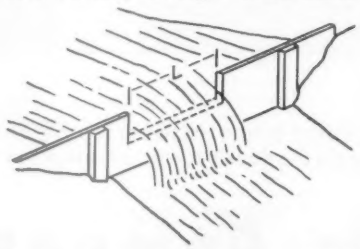


Fig. 1—Rectangular weir constructed in salt-water flow line. The upstream side of the rectangular opening is covered with a thin metallic plate cut in the shape of the weir and attached by screws to the wooden dam which is set in a concrete base

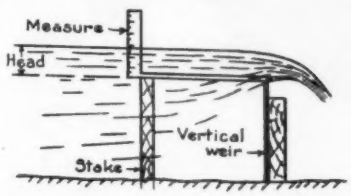


Fig. 2—Cross section of weir showing method of measuring head of water

If the notch forms a 60° angle

$Q = 1.43h$

If the notch forms a 90° angle

$Q = 2.48h$

where

Q = rate of flow of water in gallons per minute

h = height of water in feet.

If the opening in the weir is rectangular then the Francis formula is most commonly used. It is as follows:

$Q = 3.33 \times L \times h \times \sqrt{h} \times F$

where

Q = discharge of weir in g.p.m.

L = inside length of weir in feet

h = head of water in feet

F = factor for conversion of cubic feet per second to gallons per minute = 448.86.

For convenience the rate of flow of the water in gallons per minute can be read directly from a previously prepared gage table.

TABLE 1

Gage Table for Conversion of Head of Water in a Weir Expressed in Fractions of a Foot of Head Into Gallons Per Minute

Head of water in feet "h"	G.P.M. for 60° notch	G.P.M. for 90° notch	G.P.M. per foot of length for rectangular weirs
0.10	2.02	3.50	47.2
0.11	2.56	4.44	54.5
0.12	3.19	5.56	62.2
0.13	3.90	6.17	70.0
0.14	4.71	8.16	78.0
0.15	5.60	9.68	86.8
0.16	6.54	11.4	95.6
0.17	7.62	13.3	104.8
0.18	8.79	15.3	114.0
0.19	10.1	17.5	123.8
0.20	11.5	19.9	134.0
0.22	14.6	25.3	155.0
0.24	18.1	31.4	176.0
0.26	22.1	38.4	198.0
0.28	26.7	46.2	222.0
0.30	31.6	54.8	246.0
0.32	37.2	64.5	271.0
0.34	43.2	74.9	296.0
0.36	49.8	86.5	323.0
0.38	57.1	99.1	350.0
0.40	64.9	113.0	378.0
0.42	73.4	127.0	407.0
0.44	82.4	143.0	436.0
0.46	92.0	160.0	467.0
0.48	102.0	178.0	497.0
0.50	114.0	197.0	530.0
0.55	144.0	249.0	610.0
0.60	179.0	310.0	690.0
0.65	219.0	380.0	780.0
0.70	263.0	456.0	870.0
0.75	313.0	541.0	970.0
0.80	367.0	637.0	1,070.0
0.85	427.0	740.0	1,170.0
0.90	492.0	853.0	1,270.0
0.95	564.0	976.0	1,380.0
1.00	640.0	1,110.0	1,500.0

REFERENCES

1. Russell, George E., Hydraulics, Henry Holt Co., pp. 154-179, 1942.
2. Wilson, Paul, Practical Hydraulics, Water Works and Sewerage, Vo. 92, No. 6, pp. R-43—R-46, June 1945.

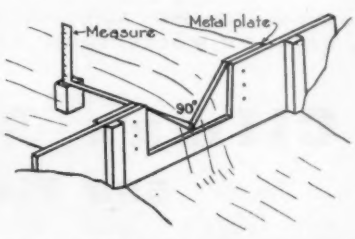
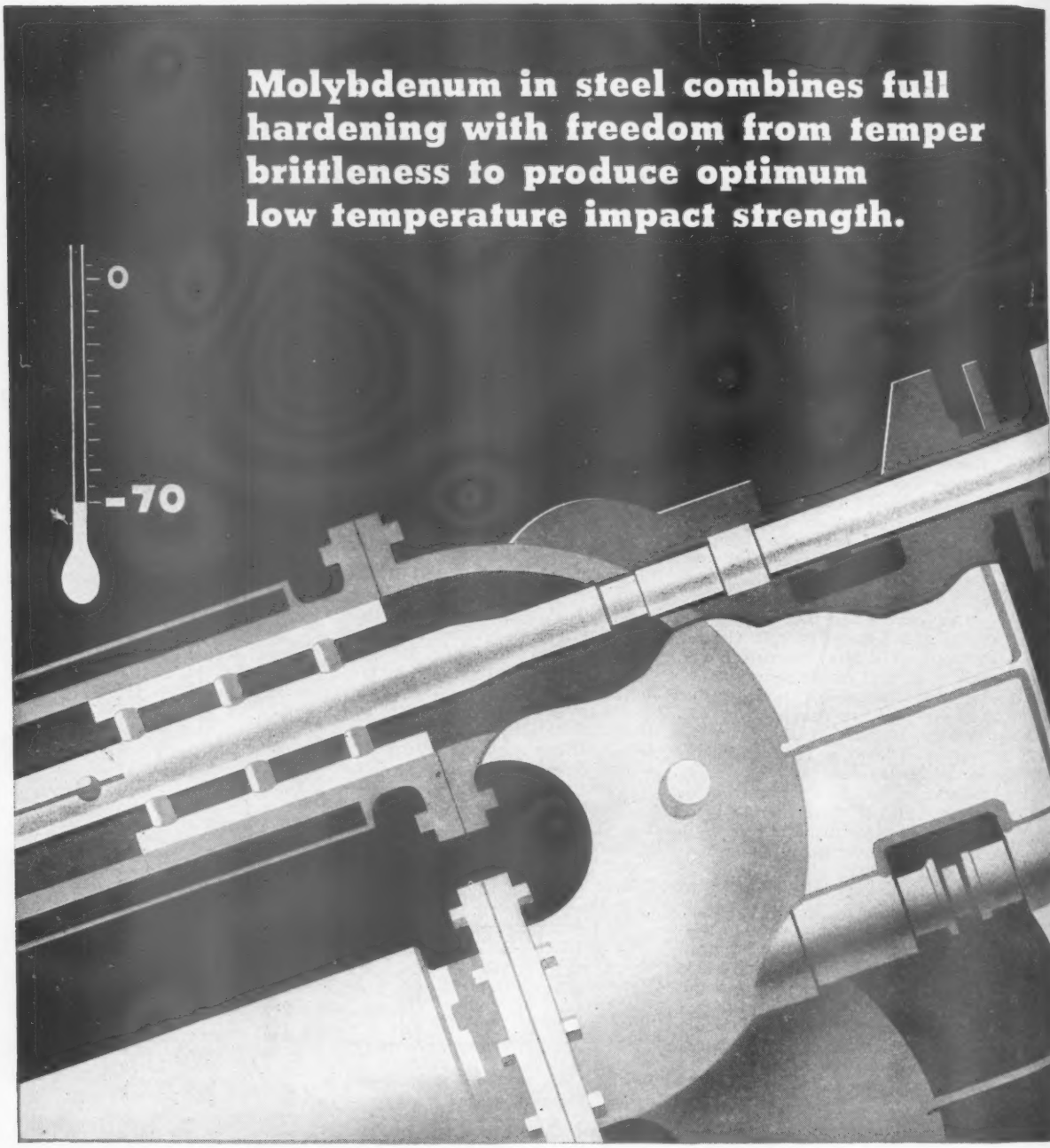


Fig. 3—A 90° notch-type weir constructed in salt-water flow line

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas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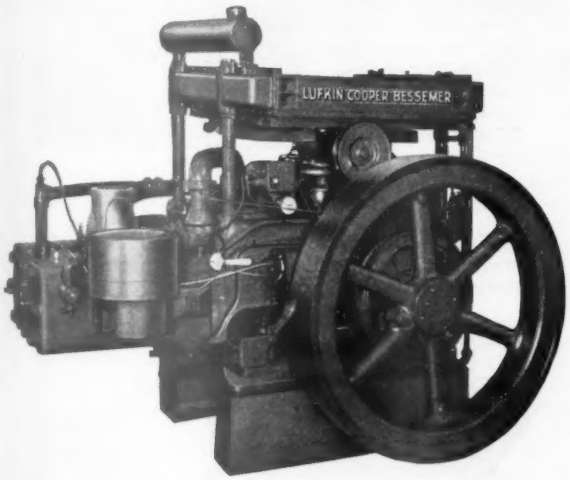
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by ***Kenneth B. Barnes***

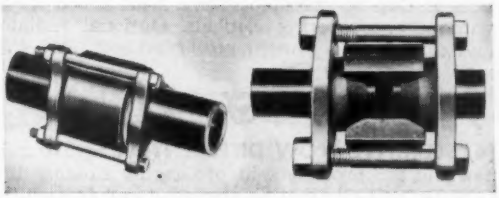
(1) TWIN-CYLINDER, TWO-CYCLE horizontal gas engine (GSDH) with speed range 300 to 600 r.p.m. and 40 to 60-hp. rating brings, from Lufkin-Cooper-Bessemer, these features: Horizontal radiator for efficient cooling and nondirectional settings; top exhaust; low height and rigid base for



steady mounting; steady uniform torque; all parts readily accessible. Can be equipped with oil-cooled pistons. Parts are massive; makes an ideal pumping engine. All major items interchangeable with the vertical GSD engine. Water-cooled exhaust port bridges. Crosshead design to connecting rods by saddle construction. *Lufkin Foundry & Machine Co.*

IT'S NEW CHECK IT

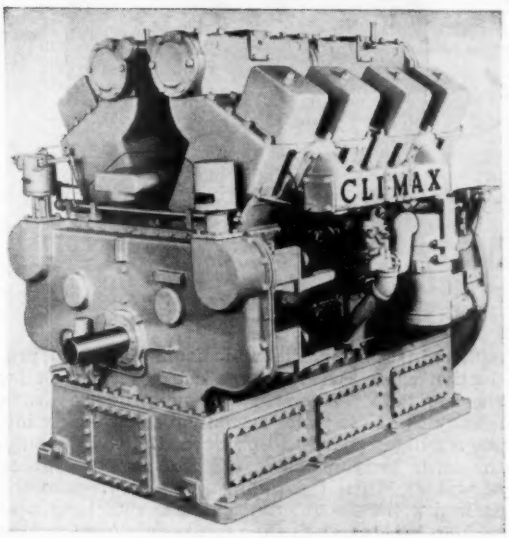
(2) KARBATE COUPLINGS now include four new connections. Of impervious carbon or graphite, they possess the mechanical strength and resistance to thermal shock and corrosive liquids and gases which are characteristic of this construction material. The FC flexible coupling is particularly suited to pipe runs connecting one process phase with another, eliminating cements in joining, and permitting pipe movement. The Type V flanged connections offer the advantages



of the Van Stone type of flanges. Separate cast-iron split flanges permit easy pipe alignment and installation. Type V nozzles and SC slotted couplers are recommended for use on tanks, towers, heat exchangers and similar equipment. *National Carbon Co.*

IT'S NEW CHECK IT

(3) NEW "V-8" 285 AND 330-HP. ENGINES provide great power in small space. An eight-cylinder, four-cycle, 60° "V" type, is available in 6½ or 7-in. bore. Compact design gives light weight and short length. Five-bearing crankshaft carried in steel-backed, cadmium-lined bearings.



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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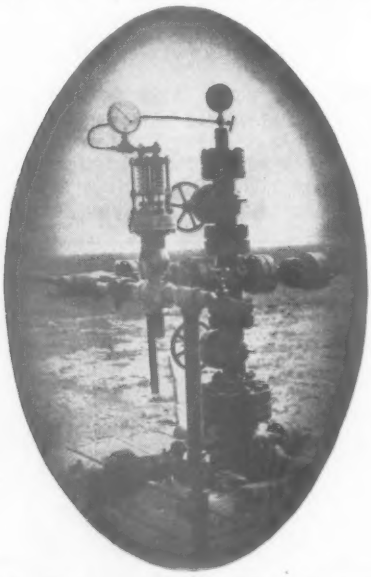
XUM

Cylinders are cast in pairs, and the wet cylinder sleeves simplify maintenance. Pistons are cast aluminum alloy. The overhead valves have inserted valve seats on exhaust service. "Blue Streak" carburetion chamber gives high horsepower output due to shape of chamber and location of valves and spark plugs, and thorough mixture of gases and efficient scavenging are obtained. Can be operated over a wide speed range without encountering criticals. Optional radiator and fan, friction clutch, power takeoff, etc. *Climax Engineering Co.*

IT'S NEW CHECK IT

(4) SELECTIVE FLOW DIFFERENTIAL regulator is new aid for producers in prolonging flowing life of wells, and eliminating annoying and frequently expensive swabbing jobs. A weak flowing well produced on a small choke often will soon load up with water, go dead, and necessitate swabbing to get back on production. The new Nixon regulator, however, serves as a well purger. It is installed in the opposite wing from the small production choke, with a large choke located below the regulator. When the tubing pressure drops, as may be due to water accumulating in the tubing, the regulator opens and produces the well through the large purging choke. This clears the tubing of water. When the tubing pressure rises to the desired point the regulator closes, switching production back through the regular small production choke. Automatic, positive, safe. *Wilson Supply Co.*

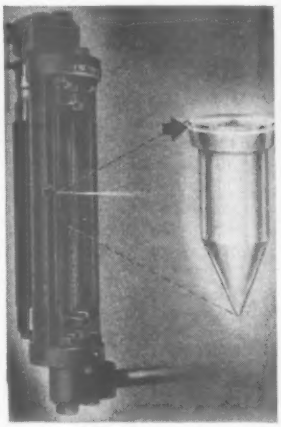


IT'S NEW CHECK IT

(5) STRIP-TYPE PLASTIC COATING is applied by spray or brush to all types of oil equipment as protection from corrosion during storage or export shipment. Is new method of protecting by use of plastic film. Can be stripped off whenever desired, leaving original surface unimpaired. Made in a variety of colors, allowing decorative and distinctive identification. Also available is field service for application of plastic coating materials to oil-storage tanks, tubular goods, and other metal surfaces as a corrosion preventive. *Plastic Coating Corp.*

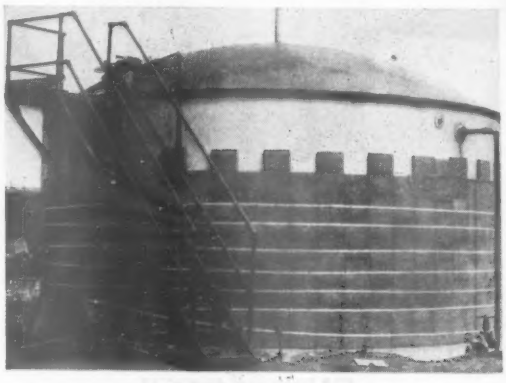
IT'S NEW CHECK IT

(6) LINE-O-LIGHT ROTOR gives clear rotameter readings of opaque liquids. Has a disk of light-transmitting material sandwiched in the rotor head which substantially reduces distance that the light must travel through the opaque liquid from its source behind tube. Rate-of-flow is sharply delineated in resultant band of light on the tube reference scale. Makes easy, accurate readings. *Schutte & Koerting Co.*

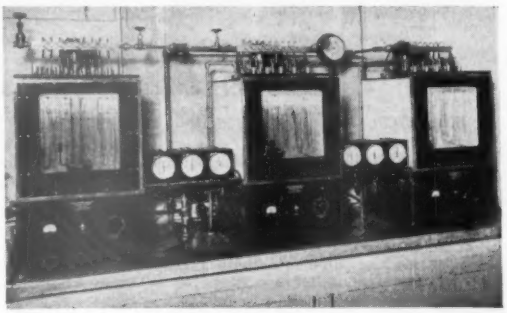


IT'S NEW CHECK IT

(7) CELLULAR GLASS INSULATION, Foamglas, combines ideal insulating values with permanency, insures long time thermal, humidity, and condensation control. Impervious to water, acid, atmosphere, vapor and fumes. Rigid, supports 30 times its weight, is totally fireproof. One cubic foot contains more than 5,000,000 cells of inert air hermetically sealed. Specific gravity only 0.168; thermal diffusivity 0.53 per sq. ft. per day per foot. Illustrated are application on a fractionating tower, the blocks being adhered with special mortar; and use on hot-oil storage tanks, with the familiar steel banding process followed. *Pittsburgh Corning Corp.*



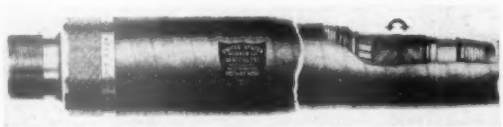
(8) ZEITFUCHS VISCOSIMETERS AND BATH (A.S.T.M. Method D-445-T) give research accuracy with speedy, simple operation and easily determined results. A modification of the Ostwald type, the viscosimeter may be mounted permanently in the bath. Breakage is negligible in control-laboratory service. Tubes are removed from the bath only for changing sizes or types. Opening and closing a cock in the suction line is only manipulation required for filling and cleaning, the



latter time being approximately 30 seconds. Error is not greater than ±0.2 per cent from true kinematic viscosity. Bath supports nine Zeitfuchs viscosimeters, maintains liquid at desired temperature within ±0.15° F., has resisto-therm unit, control panel, stirring system, vacuum manifold and Lumiline lamp. Conversion of kinematic viscosity to Saybolt and other units conveniently made. *Braun Corp.*

IT'S NEW CHECK IT

(9) NEW ROTARY HOSE is manufactured by process called Unitension which winds the main pressure-resisting wires around the rubber and fabric carcass at a scientifically determined angle. Tension on all wires in all plies throughout the



hose is equalized, placement uniform. Laboratory and field tests found high strength and good flexibility. Equipped with built-in couplings to provide full hole for mud flow. *United States Rubber Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(10) ENGINE-VALVE BOOKLET. A 20-page booklet covers installation, servicing, and maintenance of valves, seats and guides used in heavy-duty oilfield engines. Gives detailed information useful to maintenance engineers and mechanics for installation and servicing. Includes engineering drawings, factually written to be of assistance to operating men. *Thompson Products, Inc.*

IT'S NEW CHECK IT

(11) STEAM AND FLUID TRAPS. A 40-page catalog illustrates a complete line of traps. Each one

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of extensive line described in great detail. Catalog is profusely illustrated, blueprints typical applications, carries a selector chart, continuous-flow capacity tables, information on operation and maintenance and parts price schedules. *The Clark Manufacturing Co.*

IT'S NEW CHECK IT

(12) MOYNO PUMP. Bulletin tells of unusual new pump. It pumps with positive displacement, high reserve pressure, low internal turbulence. Discharges in continuous, uniform flow. Bulletin sets forth principle in detail, is well illustrated and gives displacement, pressures, port sizes, dimensions in inches, ratings and weights. *Robbins & Myers, Inc.*

IT'S NEW CHECK IT

(13) INDUSTRIAL COUPLINGS. Pocket-sized folder describes couplings, shows usual as well as special applications, lists prices and dimensions. Ends of shafts are permanently bolted in coupling to give a pliable joint of great strength requiring no protection or attention. *The Smith Power Transmission Co.*

IT'S NEW CHECK IT

(14) MOLECULAR LUBRICANT AND HIGH VACUUM PRACTICE. Circular describes in detail highly refined petroleum product and its application to vapor and vacuum pumps, nonoxidizing lubrication work. Gives pointers on extreme vacuum work. *Litton Engineering Laboratories.*

IT'S NEW CHECK IT

(15) DRILLING ENGINE. Bulletin just released gives specifications, lists new features, has power-performance graphs and fuel-consumption figures of power unit. Beautifully printed in three colors. All features of unit are clearly illustrated and described. *The National Supply Co.*

IT'S NEW CHECK IT

(16) TANK-CAR HEATERS. Well-illustrated bulletin features tank-car heaters and boosters. Covers selection, installation and specifications. Gives parts and assembly details. *Cleaver-Brooks Co.*

IT'S NEW CHECK IT

(17) AUTOCLAVES AND PROCESS KETTLES. Four-page folder describes a new development in method of heating or cooling autoclaves or process kettles. The Coil-O-Clave System is described as efficient and economical for a high rate of heat transfer. Illustrated. *Union Iron Works.*

IT'S NEW CHECK IT

(18) STEEL BUILDINGS. Folder giving complete details on prefabricated steel buildings of all types, for factories, machine shops, refineries, natural gasoline plants, pipe line stations, production houses, garages, airplane hangars, etc. *Star Manufacturing Co.*

(19) SKID-TYPE ROTARY-DRILLING UNITS. Bulletin offers complete information on improved models. Contains photographs, capacities and specifications of each unit. This is first of a series which will cover a complete line of new and improved drilling and servicing equipment. *Franks Manufacturing Corp.*

IT'S NEW ✓ CHECK IT

(20) STATISTICAL ANALYSIS OF TEST DATA. Bulletin discusses statistical methods for quality control in production and the analysis of experimental data. Bulletin points out fields of application. *Calco Chemical Div. American Cyanamid Co.*

IT'S NEW ✓ CHECK IT

(21) SANDING AND FINISHING. An 84-page book containing information about coated abrasives. Includes comprehensive recommendations for the use of coated abrasive products in industry and specifications for belt sanding, belt splices and speeds. *The Carborundum Co.*

IT'S NEW ✓ CHECK IT

(22) PROCESS EQUIPMENT. An eight-page bulletin gives a general outline of processes and equipment. Shows heat exchangers, evaporators, autoclaves, condensers, etc. Illustrated. *Union Iron Works.*

IT'S NEW ✓ CHECK IT

(23) ROTARY POSITIVE DISPLACEMENT BLOWERS. Pamphlet describes the principle of operation, design and construction features. Designed for services where volume of air or gas discharged must remain constant under variations in pressure or vacuum. Profusely illustrated, with sectional drawings and views showing construction details. *Pottstown Blower Co.*

IT'S NEW ✓ CHECK IT

(24) INDUSTRIAL SKIN IRRITATIONS. Pamphlet describes an efficient agent in combating occupational dermatitis resulting from exposure to oils, greases, solvents, and other materials. Agent is therapeutic and not merely protective. Easy to apply, odorless, greaseless, and stainless. Does not inhibit perspiration, and does not mar or soil hands, clothing, or the work itself. Sample will be sent for test. *The Tarbonis Co.*

IT'S NEW ✓ CHECK IT

(25) ROTARY DRILLING. Brochure lists different sized rotaries, giving specifications. Well-illustrated, has cutaway three-dimensional drawing occupying center spread of brochure which shows working details in four colors. *International Derrick & Equipment Co.*

MEN IN THE NEWS

H. J. LOEBL *H. R. WILSON* *D. A. SILLERS*

Herman J. Loebl has been appointed manager of distributors' service-sales, a new department; and **Harvey R. Wilson** is advanced to the post of assistant service manager for Waukesha Motor Co., Waukesha, Wis.

D. A. Sillers has resigned from his position with Lone Star Gas Co., as superintendent of gas measurement, to become president of Peerless Mfg. Co. of Dallas, Tex. He has been active in the development of present gas-measurement practices and will be available as a consulting engineer on gas measurement problems.

Galvin Manufacturing Corp. has announced the appointment of **E. S. Goebel** as acting director of field sales in the communications and electronics division. **Norman Wunderlich** resigned as sales manager effective July 1.

V. W. Mitchell, formerly in the Shreveport district offices of Republic Supply Co., has been appointed assistant district manager with headquarters in Jackson, Miss. **J. B. Lionberger** is district manager at Shreveport with **T. C. Hendricks** assistant district manager for the territory west of the Mississippi.

Gordon W. Schroedel has been appointed controller of International Derrick & Equipment Co. Schroedel has been associated with Dresser industries since April 1941.

V. C. Kneese has been appointed manager of the Dallas factory branch of General Controls Co., Glendale, Calif.

O. D. (Pete) Small is sales manager of a new sales office that has been opened at 709 Sterling Building, Houston, Tex., by East Texas Electric Steel Co., Ltd.

John C. Good has been appointed sales manager of Erie Bolt & Nut Co. Previously he was assistant sales manager. He has been associated with the company for 8 years.

Kerotest Manufacturing Co., Pittsburgh, Pa., announces the establishment of a new warehouse at 3311 East Slauson Avenue in Los Angeles, Calif., with **J. A. Swaton** as district manager for steel valves and **J. A. Norris** as district manager, brass division. **Van D. Clothier** will continue as the southern California representative for Brass Valves with headquarters at 1015 East 16th Street, Los Angeles.

John E. Ohlson, formerly with Wyeth, Inc., Philadelphia, Pa., has been appointed senior chemical engineer of Pennsylvania Salt Manufacturing Co., Philadelphia.

H. B. ("Brick") Dennis, formerly division manager, Metal Products Division, Darling Valve & Manufacturing Co., has resigned to enter the water-treating field as vice president and general manager of Solvent Manufacturing Co., with headquarters at Oklahoma City, Okla.

John C. Sykora has been elected vice president and director of sales for all divisions of the Portable Products Corp., Pittsburgh, Pa.

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Fesco Jel—Schundler's Bentonite—Colloidal Drilling Clay, offers many advantages to Drillers:—

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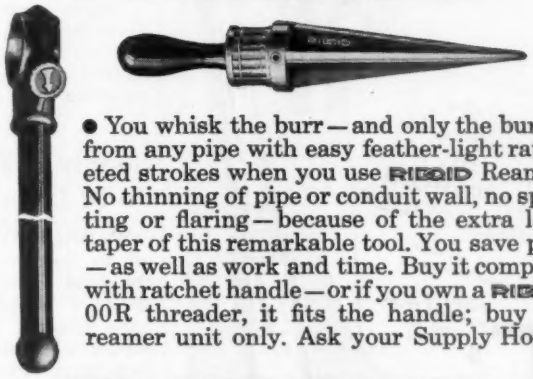

● You whisk the burr—and only the burr—from any pipe with easy feather-light ratcheted strokes when you use RIDGID Reamer. No thinning of pipe or conduit wall, no splitting or flaring—because of the extra long taper of this remarkable tool. You save pipe—as well as work and time. Buy it complete with ratchet handle—or if you own a RIDGID 00R threader, it fits the handle; buy the reamer unit only. Ask your Supply House.

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Improved cutters for ELLIOTT LAGONDA TYPE TUBE CLEANERS

Crown cutters, now standard in 1" or larger sizes on all Elliott cutter heads, have a rounded contour, give more cutter contact, with no chance of sharp corners scoring tubes. Just another refinement in Elliott tube cleaners. Bulletin? Y-250

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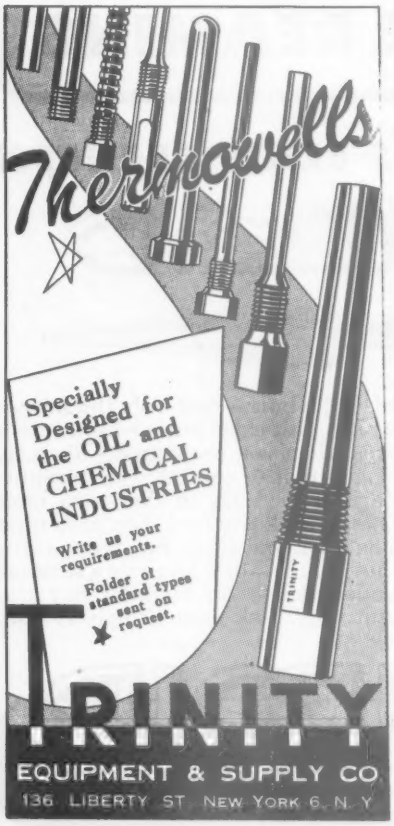
Plants in Jeannette, Pa., Ridgway, Pa., Springfield, O., Newark, N. J.
District Offices in Principal Cities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REFINING

Pure to Build $1,000,000 Coke Plant at Toledo

TOLEDO.—Construction of a petroleum coke plant here, costing more than $1,000,000, is planned by Pure Oil Co. Application for approval of the project has been filed with the Government, and work is to start as soon as needed materials are available.

The plant is expected to be used as a standby unit, for use when economic conditions make it more advantageous to conduct coking operations than to produce fuel oil. Designing and engineering work on the plant has been completed. The plant will be operated in conjunction with Pure's refinery here.

Civilian Motorists to Get More Premium Gasoline

WASHINGTON. — Petroleum Administration for War announced last week that the quantity of premium gasoline available for civilian motorists would be doubled immediately to approximately 158,000 bbl. daily. Reduced military demands for aviation fuel as a result of victory in Europe had made a little more tetraethyl lead available for motor gasoline, PAW said.

Motorists long have found it hard to find premium-grade gasoline, now about equal in antiknock quality to the best regular grade before the war.

There is no change in the total quantity of gasoline available for civilian distribution. PAW's action merely changes the proportion of premium grade.

Supply of Fuel Oil Limited To 30 Days on East Coast

WASHINGTON.—Delivery of fuel oil to large-volume consumers on the East Coast who already have 30 days' supply on hand or who have ordered more than 60 days' supply was forbidden last week by Petroleum Administration for War. The curb does not apply to homes in which three families or less are living. Consumers who believe the restriction will inflict hardship may apply for exemption at the PAW district office in New York. The action was taken, the agency said, to provide fuel oil to meet immediate military and civilian needs and to build up supplies for householders during the summer months to avoid shortages next winter.

Bombed-Out German Plant Rebuilt and on Stream

LONDON.—The Schleura oil refinery, near Hannover, Germany, bombed out during war raids on industrial installations, has been rebuilt and is in operation again, according to the Hamburg radio. Fuel from the plant, one of the country's largest, was reported to be going to 25 power stations and other former coal-consuming industries.

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"GUNITE" CONCRETE SINCE 1915

Speed in Reconversion of Refineries Is Forecast

NEW YORK.—Swift reconversion of the country's refineries to a peacetime basis will follow Japanese capitulation, according to men in the industry. Officials of Socony-Vacuum Oil Co., Inc., say it will be able to convert its 10 major refineries to civilian gasoline production within 12 hours after V-J day. The refineries, the company said, now manufacture 50,000 bbl. of the nation's aviation gasoline daily.

"Supergasoline" Now Being Produced, PAW Says

WASHINGTON.—A new "supergasoline," designed especially for aviation use, is being produced at an undisclosed number of refineries, according to the Petroleum Administration for War. Identification of the refineries and the quantity of fuel manufactured are withheld for reasons of security, Deputy Petroleum Administrator Ralph K. Davies said.

The gasoline, a higher grade than the standard 100-octane, will improve performance of planes already in operation, but the greatest improvement in performance will not be obtained until types of planes with especially designed engines go into operation. But stockpiles of the new fuel are being built up.

The added power of the new fuel, Davies said, will result in greater speed, a longer range, or a higher load factor according to the particular need for the operation.

Gulf Coast Gasoline Stocks Continue Downward Trend

HOUSTON.—Stocks of all grades of gasoline and naphthas continued their downward trend during the second half of July at plants in Gulf Coast Refiners Association, totaling 1,706,124 bbl. at the close of the month, down 41,638. Automotive gasoline stocks dipped to 642,680, down 44,801. Total stocks of all products were 3,642,190 bbl., a drop of 39,316. A year ago the total was 3,200,447. Crude runs totaled 141,882 bbl. daily.

Neches Butane Plant Runs At Its Rated Capacity

PORT NECHES, Tex.—Neches Butane Products Co., operated jointly by five oil companies for the Government's synthetic-rubber program, produced 52,000 tons of butadiene from petroleum during the first 6 months of 1945.

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DROP FORGED STEEL
LIQUID LEVEL GAGES

Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.

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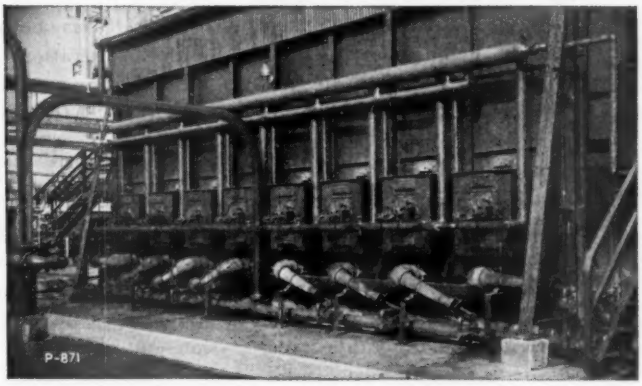
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

"BAYWAY" PROCESSES OVER 10,000,000 BBLS. IN 6366 HRS.
... and their National Airoil Burners help maintain this record

Without a turn around, this crude furnace equipped with sixteen National Airoil Tandem Block Oil Combustion Units and sixteen National Airoil "Airocool" Gas Burners, ran up a record *continuous* run of 6366 hours, to process more than ten million barrels total charge, at the "Bayway" refinery of the Standard Oil Company of New Jersey.

This was not a "one time" record. Bayway consistently maintains these figures in day-after-day performance. NATIONAL AIROIL TANDEM BLOCK OIL COMBUSTION UNITS are widely accepted by leading refineries because, adapted to either gas or oil fuel, change over can be made quickly without alteration of equipment; combustion is highly efficient; burner regulation is simple; control is either manual or automatic . . . maintenance costs are minimum.



Shown here is one end of crude furnace. Eight National Airoil Block Oil Combustion Units and eight National "Airocool" Gas Burners can be seen in this view. This is one of four crude furnaces of identical size located in this company's refineries.

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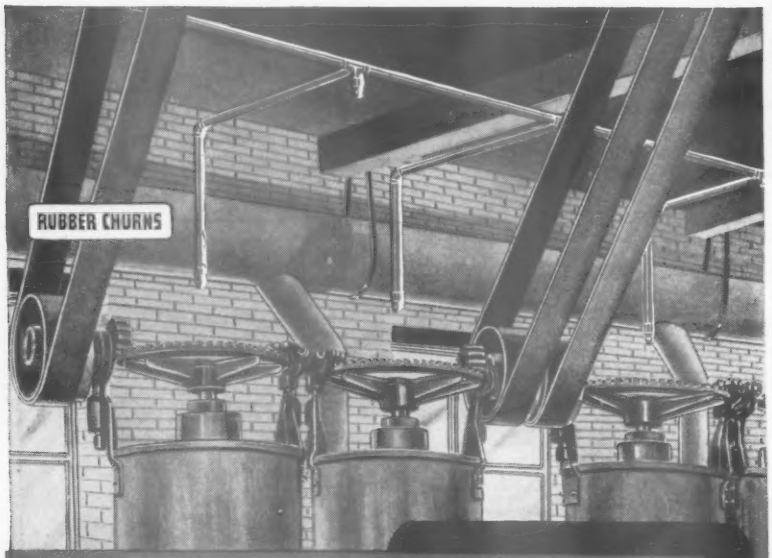

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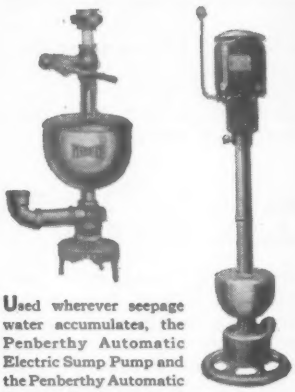

Used wherever seepage water accumulates, the Penberthy Automatic Electric Sump Pump and the Penberthy Automatic Drainer (water or steam operated) have demonstrated their superiority in this service. Simple and rugged design—copper and bronze construction throughout.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

ROPE "... in the course of Human Events"

Rope was used in drilling the first commercially-sponsored petroleum well at Titusville, Pa., in 1859. Petroleum, known to the ancient Greeks as "Sicilian oil", was first mentioned in North America by a missionary in 1629. Prior to its commercial use in 1859, petroleum was looked upon as a scientific curiosity, fit only as an illuminant. It sold for about 75 cents a gallon for crude and was much in vogue as a liniment.

Rope's foremost job today is in helping to win the war. Until that task is over, conserve every bit of rope on hand. Make each length last.

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Natural Gas

Carthage Field to Have Synthetic Gas Plant

CARTHAGE, Tex. — High-octane gasoline and other products are to be manufactured from natural gas in the Carthage field, Panola County, at a refinery to be constructed by Hydrocarbon Research, Inc., Olean, N. Y. The plant, according to announcement, will use 70,000,000 cu. ft. of gas daily in making 7,000 bbl. of finished synthesized products at the ratio of one barrel from 10,000 ft. of gas.

Reports of plans to build a $16,000,000 plant to convert natural gas into high grade gasoline in the Carthage field have been current for months.

The refinery, it is said, will be similar to the pilot plant constructed by Standard Oil Co. of New Jersey at Baton Rouge, La., and the pilot plant The Texas Co. is building in California.

End of the war is expected to bring end of gasoline rationing, a jump in demand for civilian motor fuel, and a decline in requirements for all types of military gasoline, including aviation fuel.

Commission Sets Carthage Gas Allowable for August

AUSTIN. — The daily allowable natural-gas production for August in the Carthage field has been set by Railroad Commission of Texas at 108,964,581 cu. ft. The allowables fixed for the entire month in the different horizons follow: Hill sand, 895,591,000 cu. ft.; upper Pettit, 1,273,685,000; lower Pettit, 1,148,626,000; Travis Peak, 60,000,000.

FPC Postpones Hearings On Natural-Gas Rates

WASHINGTON.—The oral argument set for September 12 on rates for natural gas sold by United Fuel Gas Co., Warfield Natural Gas Co., Cincinnati Gas Transportation, and Huntington Development & Gas Co. has been postponed by Federal Power Commission to September 14. The commission denied requests of the companies for a postponement of not less than 60 days beyond September 12. Arguments must be finished not later than noon September 15.

The commission's order of June 12 stated that oral argument is desirable in view of recent decisions of the Supreme Court in FPC cases involving Colorado Interstate Gas Co., Canadian River Gas Co., Colorado-Wyoming Gas Co., and Panhandle Eastern Pipe Line Co.

Court to Hear Arguments In United Gas Tax Case

AUSTIN.—October 3 has been set by the Third Court of Civil Appeals for arguments in the case of United Gas Corp., which seeks to recover $46,167 paid under protest. The statute levying the tax was repealed by a later act, the gas company contends.

Stanolind Buys Interest in Carthage Gas Properties

FORT WORTH.—Stanolind Oil & Gas Co. has entered the Carthage gas area, Panola County, one of the largest known reserves in the country, by paying $1,600,000 cash for a 60 per cent interest in three gas-distillate producers, one drilling well and 9,000 acres of leases considered proved. Stanolind will have control of operation and development. It also is reported the company is negotiating for the purchase of 15,000 acres of leases classified as wildcat in the county.

Provisions of Texas Butane Gas Act Are Clarified

AUSTIN.—An opinion from the office of the attorney general, requested by the gas utilities division of the Texas Railroad Commission, clarifies provisions of the Butane Gas Act, passed by the forty-ninth legislature.

The opinion outlines proper procedure for licensing of operators coming under the act and the holding of hearings by the commission. The applicant must file a $2,000 bond before his license to engage in business is issued and he must agree to furnish an indemnity bond. The length of time given to file the indemnity bond can be set out in the license, it was ruled.

Butane operators are considering plans to set up a company to issue the indemnity bonds.

Third Line to Edmonton Is To Be Started This Year

EDMONTON, Alta. — Northwestern Utilities, Ltd., which supplies natural gas to Edmonton and intervening points from the Viking and Kinsella fields, will start this year laying a third transmission line between the former field and Edmonton. Completion of the line is covered by a 5-year plan. This year's program calls for laying 16-in. line 6½ miles east and 5½ miles west of Viking. A duplicate transmission line from Edmonton to the field was completed recently. The company has crews at work extending natural-gas service to 1,700 new locations in Edmonton and about 100 in the smaller communities reached.

Northwestern Utilities is negotiating with the Lacombe municipal council for a 20-year franchise to supply natural gas to the town.

Atomic Power Could Ruin Gas Field, FPC Is Told

TOPEKA. — Atomic power could virtually ruin natural-gas and petroleum reserves, Kansas Corporation Commission told Federal Power Commission in a report submitted last November on the possible effect on the Hugoton gas field.

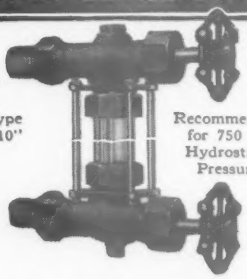
"The present accelerated rate of scientific development renders an inquiry as to the probable future utilization of almost any commodity you can name a most hazardous undertaking," said the report. "For that reason it is our view that it is probably unwise to relate this program to a too-great period of time. Perhaps the most potent possibility with which we are faced is the possible development and utilization of atomic energy. If this is accomplished, it doubtless will have the effect of rendering natural gas reserves and, for that matter, our reserves of crude petroleum, coal and our water power facilities of little or no value."

The statement said a too miserly conservation of the Hugoton field would be as injurious as extreme waste and pointed to the possibility that future development and use of atomic power could and probably would reduce the field to comparative worthlessness.

Governor Andrew Schoeppel, a former commission chairman, said he had felt the possibility of atomic power's use should be incorporated in the report.

"No one can forecast rigidly," he said, "for the next 15 or more years, the uses to which natural gas will be put. We covered the point as to just what atomic power would mean to the Hugoton gas field and to Kansas."

PENBERTHY
DROP FORGED STEEL
LIQUID LEVEL GAGES



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Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

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PIPE LINES

Great Lakes Plans 800-Mile Expansion

Great Lakes Pipe Line Co. has plans for a $6,000,000 products pipeline expansion program, according to reports. It is believed that the company intends to proceed with construction as soon as materials are available for the project.

The undertaking will involve 800 miles of 8-in. line. This will be comprised of another line from Barnsdall, Okla., to Kansas City, and a new 8-in. extension from Kansas City to Omaha, Sioux City, Iowa and Sioux Falls, S. D.

The whole project is regarded as a postwar development, if not a wartime one.

Panhandle Eastern Program Progresses

After completing 12 miles of 24-in. for the entire Indiana section of the 32-mile extension being laid for Panhandle Eastern Pipe Line Co., Midwestern Engineers, the contractor, has moved headquarters to Defiance, Ohio, for laying the remaining 20 miles.

Work of increasing the capacity of compressor stations at Centralia, Mo., Pleasant Hill, Ill., Glenarm, Ill., and Montezuma, Ind., has been 70 per cent completed by Midwestern Engineers. All construction and installation operations are to be completed October 1.

Trans-Arabian Co. Is Organized

The Texas Co. and Standard Oil Co. of California jointly have formed a second Arabian corporation in connection with plans to build a pipe line from the Persian Gulf to the eastern end of the Mediterranean.

Commenting on the organization of the Trans-Arabian Pipe Line Co. of Delaware to hold and build a pipe line from the Persian Gulf to the eastern end of the Mediterranean, W. S. S. Rodgers, chairman of the board of The Texas Co., said that negotiations for rights-of-way are now in progress but that it has not yet been determined whether the Trans-Arabian Pipe Line Co. or the Arabian American Oil Co. will hold the title to these rights-of-way.

Rodgers further stated that he could not predict when this pipe line will actually be built as shortages of labor and material stand in the way at the present time, but the pipe line will be built when circumstances warrant. How it will be financed will be determined at that time.

The stock of the Trans-Arabian Pipe Line Co., according to Rodgers, is held equally by The Texas Co. and the Standard Oil Co. of California, as is the stock of the Arabian American Oil Co., which now operates in Saudi Arabia.

Constanta-Odessa Pipe Line Reported

A petroleum pipe line from Constanta, Rumania, to Odessa, Russia, is under construction, according to reports received by The New York Times. Constanta is connected by pipe line to the Ploesti - Campina, Rumania, oil area. An extension of the pipe line to Odessa would connect the Ploesti fields to the Ukraine. It is reported that the Soviet Union is taking $160,000,000 worth of oil from Rumania as reparations.

Considerable quantities of pipe and refining machinery were removed from Rumania by the Soviet Union as partial reparations.

Extension of the pipe line to Odessa would provide large quantities of fuel for machine and tractor stations in the western Ukraine and the Moldavian Soviet Socialist Republic as well as being of strategic importance.

"Edgar" Submerged Lines Proved Successful

If "Pluto," the Allied invasion gasoline line across the English Channel made of flexible pipe, had failed, "Edgar," a similar project made of steel pipe, probably would have picked up and carried on successfully.

The Daily Express in London said "Pluto" had ceased operations, that water was washing gasoline out of the line and that occupation forces in Germany will obtain gasoline more cheaply by tanker.

The Air Technical Service Com-

mand reported that "Edgar" was being secretly developed for months at Edgartown, Mass., while British engineers were working on the other project. The latter were first to announce success, and work on the other was halted, to avoid waste through duplication. However, the steel pipe experiment was regarded as successful.

Pathway for "Edgar's" under-ocean pipe was "staked out" by radio beams as a surveyor would lay out a route for a pipe line on land, equipment on shore furnishing the beam.

The command's engineers say there still may be a use for "Edgar." It is believed submerged pipe lines might successfully be used here in the postwar era for sending gasoline short distances across water. Made of steel pipe, it will permit greater pump pressure and faster flow of gasoline than flexible type pipe.

Records Are Broken By Pipe Lined Products

New all-time records were set for pipe-line motor-fuel transportation in May. Movement of motor fuel in pipe lines in the first 5 months of the year also set a new record.

Stocks in lines and working tanks at the end of the month showed gains from both a month and a year earlier.

Motor fuel turned into pipe lines in May was 29,871,000 bbl., an increase of 29.43 per cent from the May, 1944, total of 23,079,000 bbl., and was 5.60 per cent greater than the April total of 28,287,000 bbl.

Motor fuel turned into pipe lines in the first 5 months of 1945 totaled 136,874,000 bbl. against 104,723,000 bbl. in the same 1944 period, indicating a gain of 30.70 per cent.

Motor fuel delivered from lines in May was 29,593,000 bbl., against 28,477,000 bbl. in April, and 22,929,000 bbl. in May, 1944, a 29.06 per cent increase.

Motor fuel delivered from lines in the first 5 months of the year totaled 135,165,000 bbl., against 100,277,000 bbl. in the same 1944 period, a gain of 34.80 per cent.

Stocks in lines and working tanks at the end of May totaled 13,497,000 bbl., compared with 13,254,000 bbl. a month earlier, and 12,536,000 bbl. a year earlier.

Calculations from Bureau of Mines figures indicate that the volume of motor fuel turned into pipe lines was about 43 per cent of the total production of motor fuel in May.

Inland Waterways Handle 1,000,000 Bbl. of Oil Daily

WASHINGTON.—The inland waterways system of the United States which is now handling approximately 1,000,000 bbl. of petroleum and its products daily, transported these liquid commodities a total of 65,000,000,000 bbl.-miles during the first 6 months of 1945, the Office of Defense Transportation announced.

To augment existing floating equipment in handling the petroleum burden, the ODT, since the war began, has sponsored the building or conversion of 240 steel tank barges, 43 tugboats and 21 modern towboats, all of which are now in service on inland waterways.

PIPE LINE SUPPLIES AND EQUIPMENT

BRUSHES — OF EVERY TYPE FOR EVERY PURPOSE

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Forerunners of All Full Crawler Ditchers
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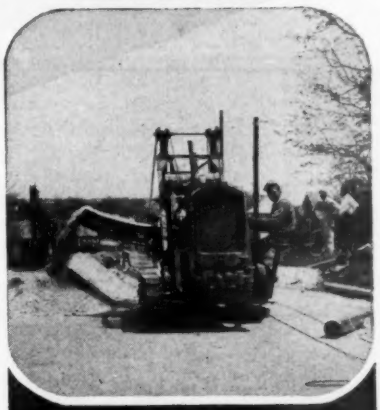

From every angle — power, speed, durability — ease of handling and portability — "CLEVELANDS" have proven themselves, on the job, performers of a superior type.

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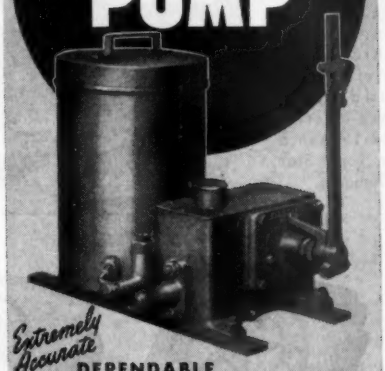

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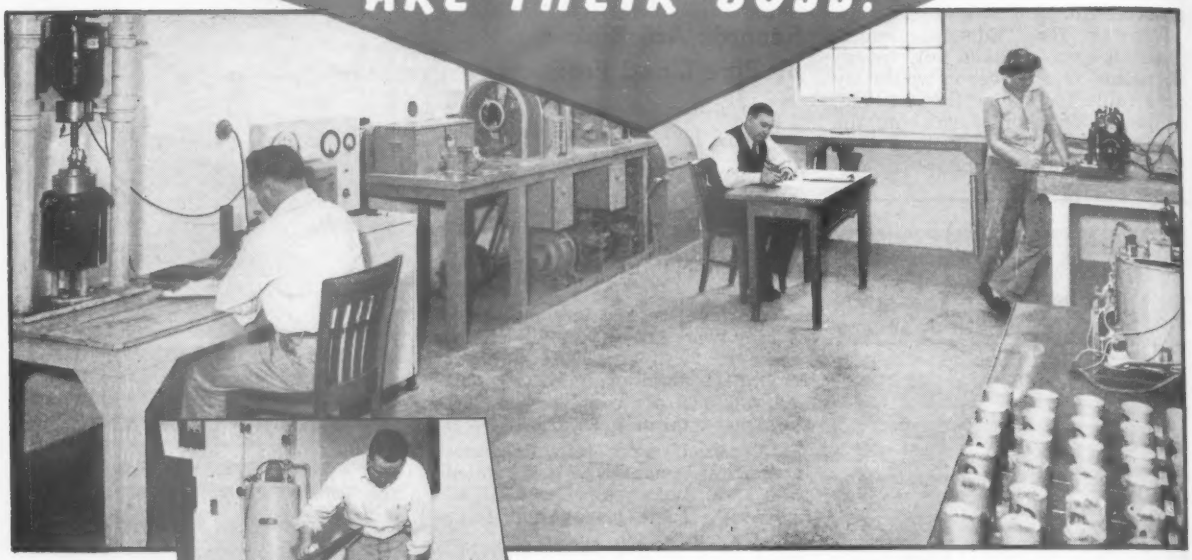

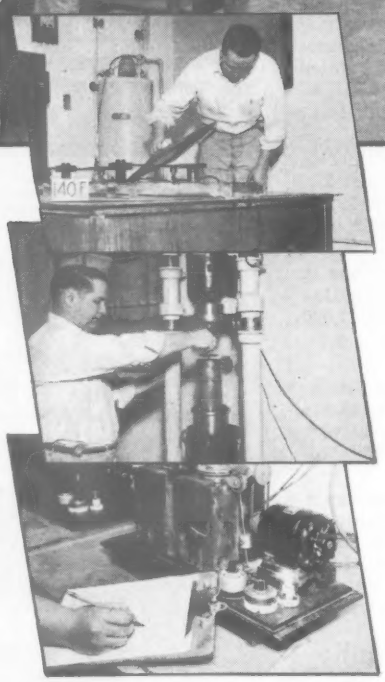

Day-in-day-out tests for strength after exposure to temperatures up to 200° F . . . tests for results under highest pressures and temperatures . . . tests for length of thickening time — all add up to pre-tested performance in Lone Star Cements.

YOU, the Oil Man, are the real boss of the Lone Star Oil-Well Cement Laboratory, shown in part above. That is so because this laboratory PRE-TESTS Lone Star Cements for performance, based upon what Oil Men say they want in the field. Quality pre-tested to your own standards — sound reason for insisting on these Oil Man's cements:

'STARCOR'* for deep wells, high strength, extra sulphate resistance. 'TEXCOR'* for deepest wells, high strength and extra sulphate resistance. 'INCOR'* for moderate-depth wells, earlier drill-out. LONE STAR CEMENT for all-around oil-field dependability. Use the cement that fits your job—pre-tested performance is a big plus.

*Reg. U. S. Pat. Off.

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Exploration and Drilling

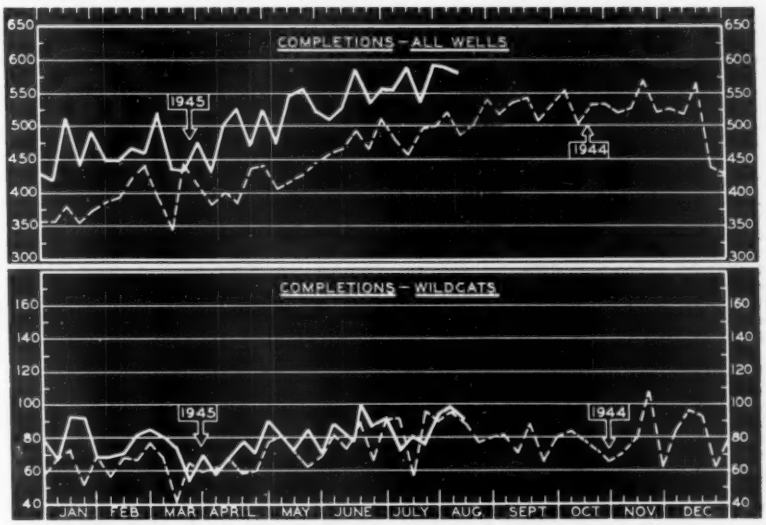
Week's Highlights

ALABAMA is in the process of getting either its second oil field, or a 2-mile extension to the Gilbertown-Melvin field. The Carter Oil Co. 1 Sam Alman, SW NE SW 5-10n-3w, Choctaw County, is now testing to determine the oil-water contact level, before final completion.

This well topped the Eutaw at 3,337 ft., and cores from 3,376-3,446 ft., recovered very porous formation, with good shows of heavy, black oil throughout. Cores from 3,446-61 ft. recovered shaley sand, with salty taste, and no shows of oil. A drill-stem test at 3,405-08 ft. and 3,413-16 ft., with two packers, open 1 hour 55 minutes, recovered 210 ft. heavy mud and oil, 180 ft. of oil-cut mud, 300 ft. of salt water cut with oil and mud, and 360 ft. of salt water cut with oil and gas. The oil appears to be 17° gravity.

The new discovery, like the wells at Gilbertown-Melvin, appears to be on a closure against an extensive fault that lies north of the Hatchetigbee anticline. The surface trace of this fault extends for a distance of about 25 miles along an east-west line.

The fault has a hade, or pitch, of about 45°, with the downthrow side to the north. The fault trace at the surface lies quite a bit south of where the wells are located. As the wells are drilled vertically from the surface, they cut through the fault plane above the Eutaw and catch the Eutaw sands on the upthrow side of the fault. Some surface geology is possible in this area, and



Solid line charts current weekly completions, service wells in Eastern area included

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 11, 1945

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1945				
	Comp.	Oil	Gas	Dry	Footage	1945	1944	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	34	17	0	*17	49,250	857	979	0	0	0	0	0	0	0	0	0	0
Pennsylvania	91	49	5	†37	163,997	2,482	2,406	0	0	0	0	0	0	0	0	0	0
West Virginia	12	2	4	6	36,996	494	536	0	0	0	0	0	0	0	0	0	0
Ohio	19	1	9	9	51,172	558	586	0	0	0	2	2	0	0	11	41	52
Indiana	4	3	0	1	8,009	119	135	0	0	0	0	0	5	0	0	18	23
Kentucky	20	14	1	5	28,425	302	426	0	0	0	3	3	17	0	2	30	49
Illinois	53	38	0	15	130,200	1,052	1,104	0	0	0	8	8	27	0	0	189	216
Michigan	14	4	2	8	34,679	466	378	1	0	1	4	6	6	0	3	161	170
Kansas	35	17	3	15	105,936	1,019	1,072	0	0	0	8	8	22	0	10	214	246
Neb., Mo., Iowa	1	0	1	0	500	13	21	0	0	0	0	0	0	0	0	9	9
Oklahoma	44	25	1	18	200,812	1,469	1,033	1	0	0	11	12	54	2	11	218	285
Texas	147	81	12	54	649,281	4,394	3,270	3	0	0	30	33	136	12	36	794	978
North Central	47	27	0	20	114,597	1,317	873	3	0	0	7	10	54	0	5	282	341
West	41	28	1	12	212,811	1,127	913	0	0	0	10	10	37	1	0	170	208
Panhandle	15	2	11	2	48,018	347	130	0	0	0	1	1	0	0	1	5	6
Eastern	3	2	0	1	18,855	198	202	0	0	0	0	0	5	6	1	52	64
Gulf Coast	24	15	0	9	176,365	992	709	0	0	0	5	5	28	4	23	169	224
Southwest	17	7	0	10	78,635	413	443	0	0	0	7	7	12	1	6	116	135
Louisiana	24	15	2	7	152,327	621	473	0	0	0	4	4	21	3	4	80	108
Northern	15	10	2	3	60,727	228	179	0	0	0	2	2	6	1	4	46	57
Southern	9	5	0	4	91,600	393	294	0	0	0	2	2	15	2	0	34	51
Arkansas	2	2	0	0	6,625	107	136	0	0	0	0	0	0	0	0	28	28
Mississippi	8	4	0	4	45,157	218	81	0	0	0	4	4	3	0	0	71	74
Southeastern States	1	1	0	0	3,568	38	21	0	0	0	0	0	0	0	1	25	26
Montana	6	4	0	2	13,710	189	198	0	0	0	2	2	7	0	0	14	21
Wyoming	7	6	0	1	22,793	124	19	1	0	0	1	2	10	0	0	23	33
Colorado	0	0	0	0	0	22	98	0	0	0	0	0	1	0	1	3	5
New Mexico	8	6	1	1	21,546	270	239	0	0	1	0	1	8	0	4	36	48
California	48	37	1	10	197,641	1,438	1,196	0	0	0	3	3	2	0	2	142	146
Total United States	578	326	42	210	1,922,624	16,252	18,150	6	0	2	80	88	319	17	85	2,096	2,517
Total previous week	589	276	75	238	1,928,716	15,674	13,882	6	1	4	88	99	312	17	83	2,017	2,429
Total Aug. 12, 1944	478	252	47	179	1,535,091	18,150	10,288	11	1	3	74	89	255	20	76	1,943	2,294

Service wells included: *17, †33.

the present well is said to check almost exactly with a surface map made in 1932.

This new well will again raise questions about the famous Hatchetigbee anticline, which is a major geological feature in this region. To date no oil has been found on it, although several tests have been drilled. At the present time there are two tests drilling on it. The J. T. Parks 1 Hobson, SW NE 9-8n-2w, total depth 3,185 ft., is fishing. The Wayne Refining Co. 1 Mitchell, SW NW NE 12-8n-3w, drilled to a total depth of 4,432 ft., plugged back to 2,200 ft., and is waiting on repairs.

SOUTH LOUISIANA

Thornwell Field Outpost Flows Gas-Condensate

NEW ORLEANS.—Cities Service Oil Co. 2 D. J. Benoit, 36-11s-5w, a northwest outpost of the Thornwell field in Jefferson Davis Parish, flowed 10,854,000 cu. ft. of gas per day on a production test, tubing pressure 2,300 lb., the gas showing 16.7 bbl. of condensate per million feet. Production is from perforations at 9,603-25 ft. Total depth is 9,720 ft., with 5½-in. casing set to 9,717 ft.

Fohs Oil Co. 5 Grady Lee Humble, 28-11s-1w, at Gueydan, Vermilion Parish, will make a squeeze job before perforating for production test. Total depth is 9,910 ft. with 5½-in. production string set on bottom. This test is credited with picking up an exceptionally good sand section.

Of the 16 new locations reported this week only one was a wildcat, situated in Terrebonne Parish. There were nine completions, with two dry wildcats, one each in LaFourche and Vermilion parishes. Iberville Parish led with two completions.

SOUTH LOUISIANA WILDCAT FAILURES

LaFourche Parish: California 1 Delta Farms 2, 60-17s-21e, dry at 12,469 ft.

Vermilion Parish: Ohio Oil 1 Elie Lelande, 8-11s-3e, 6 miles north of Abbeville production, in Leroy area, dry at 11,968 ft.

KANSAS

Lansing Pay in Offset To Arbuckle Discovery

THE British-American Oil Producing Co. 1 Pirotte, NE SE SE 11-10s-19w, offset to the Vohs pool discovery well in Rooks County, had one of the best recoveries in a drill-stem test ever received in the Lansing lime. The drill-stem test, taken at 3,343-61 ft. in the Lansing, resulted in the pipe being filled up 1,194 ft. with 35.8-gravity oil in 25 minutes, or a rate of 41 bbl. per hour. The discovery well of the pool, Darby & Bothwell, Inc., 1 Vohs, is paying from the Arbuckle.

Darby & Bothwell probably are opening a new pool for Ellis County in the 1 Cromb, NE NW NW 22-11-20w. After getting only 50 ft. of heavy oil in the Arbuckle, operators plugged back to the Lansing and perforated at 3,467-71 ft., and the hole filled 150 ft. with oil in 30 minutes. Perforated at 3,466-69 ft., a fill-up of 400 ft. was recorded in one hour. After swabbing to 3,505 ft., and treating with acid, the well had a fill-up of 3,100 ft. in 12 hours. Pumping equipment is being set up to test the well. This test is six miles southeast of the Marcotte pool of Rooks County, which is producing from the Arbuckle.

In Finney County, Atlantic Oil Co. 1 Wright, SE NW NW 33-21-34w, about one mile southwest of the Nunn pool, received 5,000,000 cu. ft. of gas after acid, from perforations at 2,537-62 ft. The Herrington was topped at 2,505 ft.

Completions this week totaled 35, including 17 oil wells. Leader in the fields was the Ryan pool, which had three oilers. Hugoton field completed three gas wells, and the 15 dry holes include eight wildcat tries. Forty-five new locations were reported this week, including 13 wildcat starts. Leavenworth and Pawnee counties each had two wildcat locations, and Butler, Douglas, Ellis, Haskell, Miami, Phillips, Saline, Sedgwick and Trego counties one each.

KANSAS WILDCAT FAILURES

Barton County: W. L. Hartman 1 Schubert, SW SE 17-18n-11w, dry, TD 3,427 ft., Arbuckle 3,398 ft.

Butler County: K. T. Weideman 1 Farmer, SE NW SE 8-29-8e, dry, TD 3,086 ft., Arbuckle 3,081 ft.

G. McDonald 1 Kasper, SW SW NW 14-24-4e, dry, TD 2,560 ft., Mississippi lime 2,495 ft.

Cowley County: Wolf Creek Oil 1 Bussart, SE NW SW 23-31-3e, dry, TD 3,376 ft., Arbuckle 3,376 ft.

Leavenworth County: Workman et al 1 Hoffine, NE NW SE 11-12-22e, dry, TD 1,550 ft., Harrington 1,473 ft.

Miami County: Liggett et al 1 Duylee, SW SW NW 19-15-22e, dry, TD 1,657 ft., Harrington 1,510 ft.

Pratt County: Lion 1 Fincham, SW SE 29-28-12w, dry, TD 4,700 ft., Arbuckle 4,643 ft.

Russell County: Lion 1 Daniels, NE SW 21-15-11w, dry, TD 3,327 ft., Arbuckle 3,272 ft.

MICHIGAN

Genesee County Wildcat Makes 6 Bbl. Per Day

SAGINAW.—A 6-bbl. a day wildcat in Genesee County and a new Mecosta County gas well high spotted Michigan oil and gas activities in the past week as operators reported 14 completions and announced 16 new locations.

Fisher-McCall Oil & Gas, Inc. developed the Genesee wildcat in Section 12 of Forest Township, getting production after acidizing in Traverse limestone formation at 1,506 ft. The new gas well, drilled by W. C. Taggart in Section 10, Big Rapids Township, Mecosta, came in at 11,800,000 cu. ft. a day.

The completions included four oil wells with a daily initial potential totaling 775 bbl., two gas wells and eight dry holes, four of those being wildcat tests.

Four of the new locations are in Isabella County, three for the Coldwater field. Others are scheduled: Two each in Clare and Mecosta, one each in Allegan, Osceola, Montcalm, Bay, Midland, Van Buren, Rosecommon and Missaukee counties.

MICHIGAN SUCCESSFUL WILDCATS

Genesee County, Forest Township: Hugh Heinig 1 A. C. Elliott, W½ NW SE 12-9n-8e, pumped 6 bbl. natural, TD 1,506 ft.

Mecosta County, Big Rapids Township: W. C. Taggart 3 Cook, NE 10-15n-10w, gas well, 11,800,000 cu. ft., TD 1,127 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Saugatuck Township: Arthur J. Boeve 1 Flemming Brothers, SE NW NW 35-3n-16w, dry in Traverse limestone, TD 1,356 ft.

Kent County, Cannon Township: Fisher-McCall Oil & Gas 1 Jane Hoffaner, SW SE NE 26-8n-10w, dry in Traverse limestone, TD 2,433 ft.

Mecosta Township: Taggart Brothers 1 Ladner, SE Sec. 3, dry, TD 1,170 ft.

Montcalm County, Cato Township: C. E. Weller 1 Charles and Elmer Keyt, NW NW SW 28-12n-8w, dry in Monroe, TD 3,645 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 11 crude oil	Distillate, allied products	August PAW quota all oils	Aug. 4 crude oil
Alabama	950	.....	500	950
Arkansas	79,900	5,400	85,400	80,050
California	943,250	60,900	1,012,900	942,250
Colorado	13,000	.....	12,000	11,800
Eastern	65,700	6,300	71,500	63,250
Florida	200	.....	.....	200
Illinois	203,800	12,000	212,000	204,000
Indiana	13,200	.....	13,000	13,700
Kansas	268,250	4,500	278,500	257,550
Kentucky	29,250	2,600	30,600	29,300
Louisiana	365,100	42,000	402,000	366,200
North Louisiana	69,400	.....	.....	70,500
South Louisiana	295,700	.....	.....	295,700
Michigan	50,100	800	47,800	47,750
Mississippi	52,850	.....	53,000	52,750
Montana	23,600	300	22,300	23,600
Nebraska	850	.....	1,000	850
New Mexico	103,550	6,800	111,800	103,550
Oklahoma	391,000	28,000	408,000	390,850
Texas	2,222,700	166,000	2,356,000	2,222,700
East Texas	380,900	.....	.....	380,900
East Central Texas	145,600	.....	.....	145,600
North Central Texas	152,850	.....	.....	152,850
Texas Panhandle	88,000	.....	.....	88,000
West Texas	526,650	.....	.....	526,650
Southwest Texas	361,100	.....	.....	361,100
Texas Gulf Coast	567,600	.....	.....	567,600
Wyoming	106,350	3,500	121,700	108,300
Total United States	4,933,600	399,100	5,240,000	4,919,600
Change from previous week	up 14,000			

Total production January 1-August 11, 1945 ..... 1,075,003,000 bbl.
Same period last year ..... 1,003,337,350 bbl.

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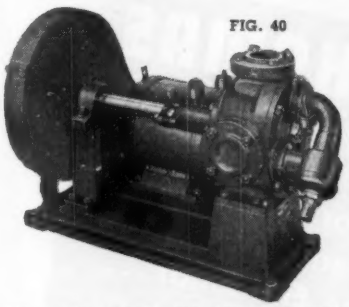

FIG. 40

200 - 300 - 450 - 750 AND 1050 GPM CAPACITIES — OTHER MOTOR DRIVE UNITS AVAILABLE DOWN TO ½ GPM

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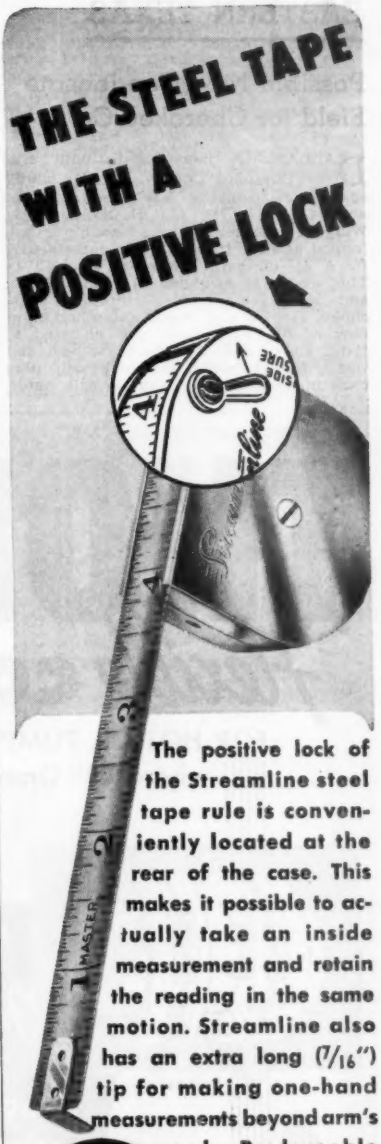

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EASTERN TEXAS

Possible New Condensate Field for Cherokee Co.

DALLAS. — A new gas-distillate area for Cherokee County, 8 miles southeast of Jacksonville, has been indicated at T. G. Shaw, Inc. 1 J. H. Bolton, C. L. Widgeon Survey. The Woodbine was topped at 4,171 ft. and total depth is 4,177 ft. A 4½-in. casing was set at 4,173 ft. The well was swabbed down to 600 ft. and it began cleaning through ¼-in. choke, flowing gas, wash water and rainbow of oil. The choke was changed to ½-in. choke and it flowed gas and salt water for 14 hours. Operator will plug back in an attempt to shut in salt water.

Humble Oil & Refining Co. 1 Maness, Musquez Survey, wildcat 8 miles southeast of Rusk, Cherokee County, perforated around 8,700 ft. and recovered a slight show of gas while swabbing down to 2,000 ft. from surface.

The Texas Co. 1 Mrs. Nancy Ham, R. Lawson Survey, wildcat 4 miles east of Teague, Freestone County, took a 45-minute drill-stem test with packer at 7,536 ft. There was a slight blow of air and 30 ft. of slightly brackish gas-cut mud was recovered. Bottom-hole pressure was 700 lb. Total depth is 7,548 ft.

Humble 1 Nichols, J. F. Teer Survey, is the third failure for the Pickton pool of southern Hopkins County. It is dry at 7,950 ft. Stanolind Oil & Gas Co. has staked an 8,500-ft. wildcat in the Roseborough Springs sector of Harrison County. It is 1 Cole in the Charles Taylor Survey, 9 miles south of Marshall.

The Long Lake field, Anderson County, Carthage field, Panola County, and Sand Flat field, Smith County, each had one completion this week. The Carthage field reported four new locations.

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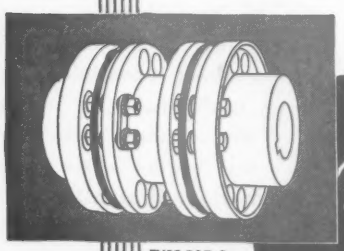
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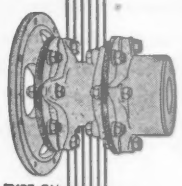
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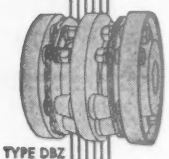
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ILLINOIS

Good Wells in Clay City And Divide West Fields

CENTRALIA. — Thirty-eight oil wells and 15 dry holes were reported completed in Illinois during the past week. The oil wells averaged 122 bbl. per well in initial production, ranging all the way from 586 bbl. down to ½ bbl. Four of the new wells averaged 507 bbl. per day in first-day output.

In the Mattoon pool in Coles County H. Gordon 1 Litwiler, NW NE NE 3-11n-7e, was testing Aux Vases sand at 1,938-43 ft., after having found a showing of 10 bbl. per hour on the swab from Cypress sand at 1,774-1,800 ft. Aux Vases sand also made a favorable showing and the well may be good for about 200 bbl. per day. It extends the pool one location southwesterly.

The Texas Co. 1 Bowyer, SE SE NW 34-1s-5e, a wildcat about 3 miles from production was about to test Aux Vases sand at 2,974-81 ft. It had been given a drill-stem test of 2 hours' duration, showing gas in 50 minutes, 1,800 ft. of oil and 180 ft. of oil-cut mud.

Pure Oil 1 T. H. King, SW NE SE 26-1n-8e, Clay City Consolidated field in Wayne County produced 517 bbl. in 24 hours from McClosky lime at 3,113-16 ft., total depth 3,128 ft. In the same field Pure completed 3 M. G. Hoard, SE SW SE 23-2n-7e, in McClosky lime at 3,005-45 ft. and got an initial production of 410 bbl.

The Texas Co. 3 K. Bayer, NE NW SE 23-1s-3e, Divide West pool in Jefferson County, was good for 488 bbl. in 24 hours from McClosky lime at 2,741-59 ft.

Two new oil pools, two new pays in old fields, and five extensions were chalked up by Illinois wildcatters during the month of July, according to the State Geological Survey. Aden South, Hamilton County, and Maunie West, White County, both McClosky pools, were the new discoveries. The Aux Vases in the Brownsville pool, White County, and the Rosiclare in the Parkersburg Consolidated pool, Richland County, were the new pays. Extensions were completed to the Mattoon pool, Coles County, Ellery South, Edwards County, Clay City Consolidated, Wayne County; Bible Grove, Effingham County, and Herald, Gallatin County.

Clay City Consolidated, Bible Grove, Boyd, and Thackeray pools continued to be the most active. The Bible Grove pool now extends 5 miles north and south, with active drilling in an area of 3 square miles in Effingham County, and all recent wells producing from McClosky.

ILLINOIS WILDCAT FAILURES

Clinton County: Big Chief 1 Gieseike, SE SW NE 9-2n-5w, dry, TD 2,942 ft., Trenton 2,756 ft.

Edwards County: S. L. Dedman et al 1 Woods, NE SW SE 6-2s-10e, dry, TD 3,472 ft., McCloskey 3,435 ft.

Fayette County: H. Luttrell et al 1 Larrimore, SW SW NE 25-9n-3e, dry, TD 1,716 ft., Aux Vases 1,703 ft.

H. Luttrell 1 Grube, NW SE SW 26-5n-3e, dry, TD 2,335 ft., Benoist 2,044 ft.

Jasper County: D. E. Schock 1 Lancaster, SE SE NW 1-5n-8e, dry, TD 3,184 ft., Fredonia 3,095 ft.

Jefferson County: C. A. Lynch 1 Richardson, NW NE SW 20-3s-3e, dry, TD 2,892 ft., St. Louis 2,861 ft.

Madison County: Sohio 1 Huber, SE SE NE 5-4n-5w, dry, TD 1,984 ft.

Wayne County: Pure 1 Holland, SW SW SE 13-1s-8e, dry, TD 3,215 ft., St. Louis 3,201 ft.

PERMIAN BASIN

New Pay Indicated For Goldsmith Pool

MIDLAND.—A new pay horizon for the north end of the Goldsmith pool of northwestern Ector County was indicated in tests of Stanolind Oil & Gas Co. 3-Q Scharbauer, scheduled 10,000-ft. wildcat. The test is in Section 12, Block A, Public School Land Survey. Surface elevation is 3,159 ft. On a 2-hour drill-stem test at 6,148-6,210 ft., in the upper part of the Fullerton pay, 550 ft. of clean sweet oil, 41.4° gravity, and 300 ft. of heavily oil and gas-cut drilling mud was recovered. A later drill-stem test, with tool open for the same period, at 6,230-85 ft. showed gas to the surface in 15 minutes and recovered 558 ft. of heavily oil and gas-cut mud, no free oil and 62 ft. of sulfur water. It was drilled to 6,359 ft. where another drill-stem test will be run.

Sinclair Prairie Oil Co. 1 Williamson, Section 4, Block 45, T-1-N, T&P Survey, wildcat 2¼ miles west of the TXL pool of western Ector, with elevation of 3,338 ft., topped the Silurian at 6,680 ft. and the Simpson at 9,030 ft. It was drilling below 9,695 ft. with no shows reported. The Texas Co. 29 W. E. Connell, Section 9, Block B-16, Public School Land Survey, wildcat 2 miles west of the Penwell field of southwestern Ector, recovered 500 ft. of drilling mud with no shows on a 15-minute drill-stem test at 5,950-6,030 ft. It was drilling below 6,060 ft.

Crane County.—Gulf Oil Corp. 2-E Henderson, Section 25, Block B-27, Public School Land Survey, 2⅞ miles northwest of the Sandhills district, has opened a new Tubb producing area. The well was drilled to 4,445 ft. and a 40-minute drill-stem test was run with packer set at 4,370 ft. The last 28 minutes of the test oil flowed at the rate of 40 bbl. per hour with gas volume of ,600,000 cu. ft. daily. The well is ½ mile southwest of 1-E Henderson, which was recently completed as a gas well in the Tubb horizon. John I. Moore et al 1 Southland Royalty, Section 19, Block 2, H&TC Survey, wildcat 6 miles southeast of the Sandhills district, ran a drill-stem test in the Devonian from 6,120-6,346 ft. and recovered 240 ft. of oil and gas-cut mud. It was drilling below 6,594 ft. in unreported formation. Magnolia Petroleum Co. 1-B H. H. Tucker, Section 25, Block 1, H&TC Survey, wildcat 2½ miles northwest of the McKee pool, recovered 4 ft. of green shale with streaks of sand carrying slight showing of oil on a core at 5,761-71 ft. A core at 5,771-75 ft. had no shows. It was coring ahead.

Phillips Petroleum Co. reports two failures. In northern Glasscock County, Phillips 1 McDow, Section 31, Block 34, T-2-S, T&P Survey, 1 mile southeast of shallow production, is dry at 10,915 ft. in the Ellenburger. In Pecos County, 9 miles northwest of Fort Stockton, Phillips 1 Powe, Section 3, Block OW, T. M. Survey, is dry at 12,127 ft. after drilling through the Delaware into the Pennsylvanian.

The Fullerton field, Andrews County, reported eight completions, the South Cowden field, Ector County, and the Howard-Glasscock field, Howard County, each reported two. The Keystone-Ellenburger field, Winkler County, led in field locations with six, while the Sandhills-Tubb and Waddell fields, Crane County, and the North Ward-Estes field, Ward County, each had three.

(Continued on page 188)

ROCKY MOUNTAIN

Overthrust Fault Area Getting Two Tests

DENVER.—Several wildcats getting under way in the Rocky Mountain area will be closely watched on account of drilling sites being selected without regard to surface geology and based entirely on geophysical investigations. One of these is the General Petroleum Corp. 38-3-G, SE SW 3-25n-8w. This test is up against and east of the Rocky Mountain range, where there are a series of disturbed belts and overthrusts in which the Madison limestone (Mississippian) overlaps the Cretaceous and surface geology is of little value. Another test of this type is Carter Oil Co. and Phillips Petroleum Co. 1 Weaselhead, SW NE 28-34n-12w, on the Milk River structure in Glacier County, 20 miles south of the Canadian border. Many thousands of acres have been blocked up between these two important tests by major companies.

Cities Service to test West Cherokee.—Cities Service Oil Co. has spudded in a test on the west end of the Cherokee Ridge fold in southwestern Wyoming in its 1 Unit, SW SW SE 34-13n-97w, Sweetwater County. The location is 7 miles north of the Powder Wash oil and gas field in northern Colorado and 30 miles west of the deep test being drilled by Texas Co. on the Baggs structure in Carbon County. It will explore the Wasatch formation of Tertiary age. This east-west fold stretching for miles parallel with the

(Continued on page 188)

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N. CENTRAL TEXAS

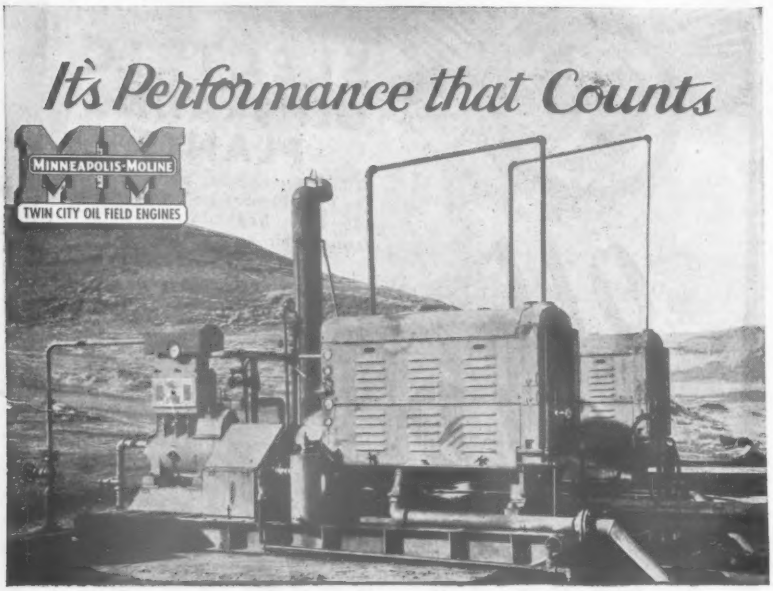
Jack County Wildcat Has Good Drill-Stem Test

WICHITA FALLS. — Hanlon-Buchanan, Inc. 1 Mathis, G. W. Davis Survey, wildcat 10 miles southwest of Jacksboro, Jack County, ran a 45-minute drill-stem test at 4,752-68 ft. in the Bend conglomerate. Twelve barrels of oil and 1½ bbl. of drilling mud was recovered. Bottom-hole pressure was 1,980 lb. in 15 minutes. It was drilling ahead at 4,768 ft. Roeser & Pendleton, Inc. 1 McAnally, Lot 18, Block A, Henderson County School Lands, wildcat ½ mile northeast of Joplin, Jack County, set 7-in. casing at 4,430 ft. The test flowed 3.6 bbl. of oil the first hour, 3.6 bbl the second hour, 12.6 bbl. the third hour and 12.6 bbl. the fourth hour through open 2-in. tubing. Casing pressure was 250 lb. Caddo conglomerate was topped at 4,400 ft. Total depth is 4,446 ft.

The Texas Co. 1 F. & M. Trust Co., Section 644, Block H, W&NW Survey, wildcat 5 miles northwest of Childress, Childress County, ran a 30-minute drill-stem test at 7,142-45 ft. and recovered 450 ft. of drilling mud with no shows of oil or gas. It was drilling below 7,483 ft. in lime. Humble Oil & Refining Co. 1 Furd Halsell, Section 266, Block H, H&TC Survey, wildcat 10 miles southwest of Thalia, Foard County, ran a 1-hour drill-stem test at 5,247-67 ft. Recoverey was 90 ft. of mud with a slight odor of oil. Bottom-hole pressure was 2,100 lb. It was drilling below 5,648 ft. in lime and shale.

Continental Oil Co. 1 Golightly, D. Martindale Survey, south offset to the discovery of the Hundley pool of southern Montague, has been completed for 1,512 bbl. of oil in 24 hours through perforations at 6,304-44 ft. This is the largest producer in the field. Ohio Oil Co. 3 Ross, R. B. Masterson Survey, extended production ½ mile west in the Ross pool of eastern King County when it was completed to flow 163.44 bbl. of 38.8-gravity oil in 3 hours. Total depth is 5,269 ft.

(Continued on page 188)



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TEXAS GULF COAST

New Production Given Cedar Bayou Area

HOUSTON.—New oil production is being opened in the Cedar Bayou area of Chambers County by Butcher-Arthur, Inc. 1 First National Bank of Goose Creek, in Christian Smith Survey, Abstract 22. Drilled to a total depth of 7,514 ft., with 5½-in. casing set on bottom, pipe was perforated with 24 shots at 7,180-84 ft., and drill-stem test recovered 18 stands of oil and 18 stands of salt water. These perforations were squeezed and new perforations made just slightly higher and it is flowing 5 bbl. per hour through a ⅛-in. choke. This production is from the lower Frio.

A new oil field for the Texas Gulf Coast district is being opened by the Sinclair-Prairie Oil Co. at 1-A W. A. Schweke, located about 2 miles southeast of New Ulm, in western Austin County. On a production test through drill-stem with 40 perforations at 9,155-65 ft., it flowed 90 bbl. of 35° gravity oil in 14 hours through a ⅜-in. choke, 100 lb. pressure, no salt water. Squeeze jobs had been made before perforating for the production test. Total depth of the hole is 10,013 ft.

Stanolind Oil & Gas Co. has opened a new deeper sand, as well as opening first oil production, in the East Bay City area of Matagorda County. The 1 E. L. Barth, producing through perforations at 10,424-28 ft., flowed a potential of 40 bbl. per day of 30.5° gravity oil through a 7/64-in. choke, tubing pressure 3,400 lb., gas-oil ratio 6,975 to 1, no water. Total depth is 10,493 ft. The discovery well, the only other producer in the area, was completed as a gas-condensate well in perforations at 10,095-123 ft.

The Columbus field of Colorado County has been extended 3,500 ft. northwest from the discovery well by Cities Service Oil Co. et al 1 John Schobal, in the James Tumlinson Survey. On a 4-hour drill-stem test through 16 perforations at 8,495-99 ft., using ¼-in. top and bottom chokes, the well showed 1,600 lb. working pressure, and flowed at the rate of 2,515,000 cu. ft. of gas with 101 bbl. of condensate daily. Tests will be run at other levels before final completion is attempted. Total depth is 9,752 ft., with 5½-in. casing set on bottom

Glenn H. McCarthy 1-A A. G. Blanke, discovery well about 3 miles northeast of Hankamer in Liberty County, is now shut in after testing gas and condensate at the 8,500-ft. level on a production test. Total depth is 8,550 ft. No gage has been reported on this well.

There were 16 new locations this week, 2 being wildcats, 1 each in Liberty and Wharton counties. Chambers, Harris and Jefferson counties each had three new locations. Of the eight completions two were dry wildcats, one each in Brazoria and Chambers counties. Brazoria County led with three completions.

UPPER GULF COAST WILDCAT FAILURES

Brazoria County: General Crude Oil 5 Belle H. Wisdom, Abraham Darst Sur., 1 mile west of Damon, dry at 6,037 ft.

Chambers County: Gulf 1 W. F. Mayes et al, Lost Lake Area, E. Dorr Sur., Abstract 74, dry at 9,943 ft. in salt.

CALIFORNIA

South Coles Levee Field To Be Extended Eastward

LOS ANGELES.—Union Oil Co. will extend the productive limits of the South Coles Levee field about 1,000 ft. eastward upon the conclusion of drilling operations on 34-12 Kernco in Section 12-31s-25e, and prove up several additional locations. This projected completion is expected to be tanking oil within the next few days although some little difficulty has been experienced running in the liner due to a tight spot around 9,300 ft. This outpost, on a short formation test a few days ago, flowed at a daily rate of 1,500 bbl., so a good flowing well is anticipated. Stevens oil sand was cored at 9,846-976 ft. and 7-in. casing has been cemented at 9,839 ft. The coring of 130 ft. of oil sand in this outpost well indicates the possibility of developing production still farther east off the southern tip of the field and such drilling will be done by either Union Oil Co. or the South Coles Levee Unit Plan.

In the Cymric section of the McKittrick field of Kern County, where a deep sand was found productive a few weeks ago, Union Oil Co. is drilling ahead in 55-26 Anderson at 3,892 ft. after failing to make a formation test because of a mechanical failure. The company made two attempts to conduct a formation test of the interval that was found productive in 45-26 Anderson in July and finally instructed the crew to resume drilling. When the discovery well was started the company was shooting for the Carneros sand and did not expect to find production in the zone cored at 3,580-3,610 ft. The showing of this Anderson sand on a formation test was so good, however, that the company changed the well's objective and took advantage of this new pay. The Carneros sand should be encountered without too much additional hole in 55-26 Anderson and Union should, therefore, get some idea of this sand's potentiality very soon. In the meantime, Standard Oil Co. has started wells in Sections 24 and 25 and has completed preparations for a well in Section 26, all around the Union discovery. In Section 25, Standard is completing 1-7 Weston in the upper zone and will probably get a good well within the next few days as a formation test at 1,247-343 ft. resulted in a recovery of 450 ft. of gassy mud and 100 ft. of gassy-oily mud. Previously a formation test at 1,045-1,147 ft. saw the well flowing about 500,000 cu. ft. of gas from an overlying dry gas sand. A squeeze job has been done on the 7-in. casing landed at 1,025 ft. and tubing is now being run in the hole. Standard's 1-7 Weston will extend the productive limits to the east a few hundred feet.

CALIFORNIA WILDCAT FAILURES

Kern County, Temblor: Richfield 1-1 Temblor, 36-31s-21e, bottomed in gray shale, only minor showings, TD 9,460 ft.

Los Angeles County, Pico: Rothschild Oil 1 Rohleder, 7-2s-112, bottomed in gray sand, no showings, may have provided marker, TD 1,306 ft.

San Luis Obispo County, Paso Robles: Norris Stamping 1 Clark, 3-27s-13e, bottomed in gray sand and shale, no showings, TD 3,336 ft.

WASHINGTON

SEATTLE.—Standard Oil Co. of California is planning to drill well in Whatcom County, at a spot where two shallow wells were drilled several years ago failed to produce. Oil and gas leases have been obtained for an area of about 25 miles between Blaine and Ferndale, just below the Canadian border.

Drilling has been halted on the Sharples Corp.'s third test well in the Wishkah Valley area, because the bit hit a crevice. Drilling is expected to resume soon.

SOUTHWEST TEXAS

Possible New Pool For Goliad County

CORPUS CHRISTI.—W. C. McBride, Inc. 1 August Kenne, a wildcat, 6 miles west of Weesatche, in J. W. Bergen Survey, Abstract 66, Goliad County, cored gas sand at 7,711-18 ft. On a 15-minute drill-stem test, using 1,000-ft. water cushion, 6,500 lb. working pressure, the well recovered 60 ft. of oil. At 7,718-24 ft. porous sand with oil saturation was cored. On drill-stem test operators recovered 66 stands of salt water. Operators are now reaming to set casing.

Santa Clara Oil Co. 1-A Volney M. Brown et al, a wildcat, 12 miles west of Whitsett, in R. H. Brown Survey, Abstract 747, McMullen County, is dry at total depth of 6,503 ft.

Sun Oil Co. 1 S. Cantu et al, wildcat 17 miles east of Rio Grande City, Porcions 39 and 40, in Starr County, is dry at total depth of 6,888 ft.

There were 37 new locations reported this week with 13 being wildcats. Jim Wells and Nueces counties led with five new locations each. Duval County was next with four locations. Of the 33 completions 10 were wildcats, all dry, one each in Atascosa, Duval, Goliad, Jim Hogg, Karnes, McMullen, San Patricio,

(Continued on page 188)

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OKLAHOMA

Phillips' Airport Well May Be Edmond Extension

CITIES SERVICE CO., Mid-Continent Petroleum Corp. and Phillips Petroleum Co. 1 Lawson, C SW NW 22-5n-4w. McClain County, the most important of Oklahoma's recently drilled wells, flowed 329 bbl. of oil in 6 hours on Monday's gage, through 24/64-in. choke. The previous Friday's production was 852 bbl. in 8 hours through ¾-in. choke, with gas at the rate of 6,700,000 cu. ft. per day. Top of the Bromide (Wilcox) sand was found at 10,812 ft., total depth 10,997 ft. Five-inch pipe was set at 9,992 ft., and pipe was perforated with 192 shots from 10,953 ft. to the bottom of the hole. As perforations were topped at a point 141 ft. below the top of the sand it is probable that further perforations would uncover considerably more pay. The well's allowable production is 300 bbl. per day. The gravity of the crude is 46.8 degrees. No water had shown.

Phillips Petroleum Co. and Carter Oil Co. 1 Jirick, C SW SW 26-16n-5w, Kingfisher County, showed oil and gas on a drill-stem test last Friday. Top of the Hunton lime was found at 7,065 ft., and drill-stem test was made at 7,000 to 7,087 ft. Recovery was 180 ft. of oil, 480 ft. of oil and gas-cut mud, but no water. Another well on the big block of the two companies' 1 Roffman, C NE NW 12-15n-5w, also in Kingfisher County, was swabbing with no results from Hunton lime at 7,016-36 ft., total depth 7,334 ft.

Phillips Petroleum Co. 1 Airport, C NE NE 8-12n-4w, Oklahoma County, had Hunton lime at 7,193 ft., total depth 7,251 ft. Casing was set at 7,249 ft., 60 perforations were made at 7,220-33 ft., and the lime was given a 500-gal. shot of acid. The well flowed 289 bbl. of oil in 11 hours through various-sized chokes. It is 1½ miles south of the West Edmond field.

OKLAHOMA SUCCESSFUL WILDCAT

Seminole County: New oil pool.—F. C. Hall 1 Damron, NE NE NW 20-6n-7e, pumped 46 bbl. from sand at 1,900-60 ft., TD 4,203 ft., PB 1,960 ft.

OKLAHOMA WILDCAT FAILURES

Beckham County: Bud Lewis et al 2 Prather, SE SW NW 8-7n-25w, dry, TD 2,015 ft., in granite wash.

Creek County: L. B. Jackson 1 Fixico, NW SE SW 28-17n-9e, dry, TD 3,050 ft., Mississippi lime 3,024 ft.

Garvin County: Texas 1 Taylor, NW NW NE 9-3n-3e, dry, TD 2,720 ft., McLish 2,350 ft.

Rockhill Sand & Gravel 1-A Billman, SW SW SW 9-2n-3e, dry, TD 2,577 ft., Arbuckle 2,495 ft.

Jefferson County: McIntyre et al 1 Stalling, SE SW SE 10-4s-4w, dry, TD 3,631 ft., Arbuckle 3,537 ft.

Oklahoma County: Magnolia 1 Dills, NE SW NE 22-11n-1w, dry, TD 6,705 ft., second Wilcox 6,680 ft.

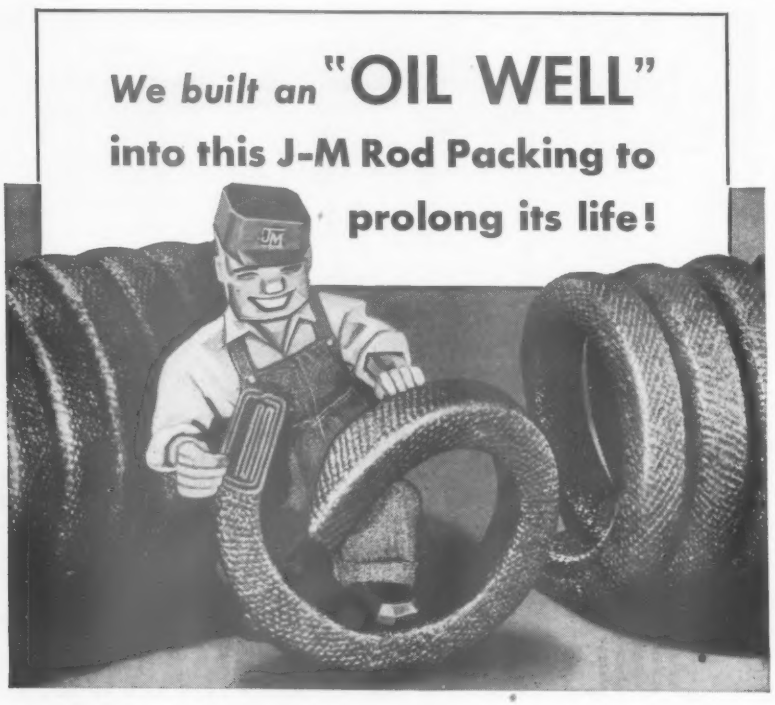
Osage County: A. G. Oliphant 1, NW NW SW 5-24n-7e, dry, TD 2,814 ft., Mississippi lime 2,737 ft.

Pawnee County: J. E. Crosbie 1 Dewitt, NE SE NW 20-20n-5e, dry, TD 3,837 ft., Wilcox 3,800 ft.

H. L. Berkey 1 Shadlow, SE SW SE 29-22n-3e, dry, TD 4,381 ft., Wilcox 4,365 ft.

Stephens County: Lundy & Morgan 2 Cox, SW NW 36-1s-7w, dry, TD 5,022 ft., Arbuckle 5,010 ft.

Tillman County: Bridwell 1 Mount, SE NE 14-4s-16w, dry, TD 5,520 ft., Arbuckle dolomite 5,470 ft.



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OHIO, KENTUCKY

Gas Wildcat Makes Gage Of 618,000 Cu. Ft.

COLUMBUS.—The Preston Oil Co. drilled in its wildcat on J. M. Imley land, Section 9, Springfield Township, Muskingum County, as a gas well with a gage of 618,000 cu. ft. Clinton sand at 3,507-57 ft. payed from 3,545-3,555 ft. Well is to be tubed and completed.

Lamp & Spencer 1 Oris Gaul, Section 33, Orange Township, Meigs County, has been drilled in as a small oil well, and probably marks the east boundary of the Hemlock Grove pool. Berea sand was found at 1,771-81 ft.

OHIO WILDCAT FAILURES

Guernsey County, Wheeling Township: Ohio Fuel 1 J. C. Bowers, Sec. 12, Clinton 4,500-4,554 ft., dry, TD 4,643 ft.

Stark County, Canton Township: Belden et al 1 David Wise, Sec. 33, Clinton 4,645-4,725 ft., dry, TD 4,760 ft.

EASTERN KENTUCKY

ASHLAND.—Pike and Lee counties took the spotlight in gas and oil completions during the week ending August 7 in the eastern Kentucky field of operations.

Kentucky-West Virginia Gas Co. completed No. 3726 on the Mary Jane Coleman property in Pike County at 3,726 ft. with an open flow of 127,000 cu. ft., after shot. Lucson Corp. completed No. 13 on the J. H. Williams property in Lee County at 829 ft., as a 10-bbl. well. A. V. Hoenig completed No. 3 on the W. A. Hay property at the head of Blaine, in Lawrence County, as a 5-bbl. well. Henry Ball completed No. 7 on the McQueen

(Continued on page 185)

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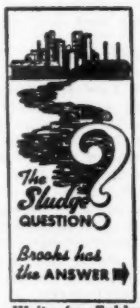

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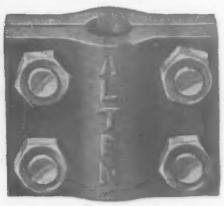

Fig. F-613

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APPALACHIAN FIELD

Washington County Gets 40-Bbl. Well

PITTSBURGH.—In North Strabane Township, Washington County, Pennsylvania, Chas. E. Young completed No. 1 Joseph Senkino in the Gordon sand showing for 40 bbl. a day. The sand was found at 2,637-2,694 ft., oil 2,664-2,671 and 2,673-2,679 ft., total depth 2,699 ft .This is the second good well to be brought in in this sand in this area. In Robinson Township, The Texas Co. wildcat on the J. P. Walker farm got salt water in the Oriskany sand. Three new well locations were reported in southwest Pennsylvania, two in Armstrong County and one in Westmoreland County.

In De Kalb district, Gilmer County, West Virginia, Carnegie Natural Gas Co. completed No. 1615 Lee R. Whiting in the Big Lime, gaging 447,000 cu. ft., total depth 1,873 ft. In Buckhannon district, Upshur County, Pittsburgh & West Virginia Gas Co. completed a dry hole in the Benson sand in No. 8065 Earl Smith at a total depth of 4,751 ft.

Fifteen new locations were reported in West Virginia: One in Scott district, Boone County; one in Barboursville district, Boone County; one in Sheridan district, Calhoun County; one in De Kalb district, Gilmer County; three in Grant district, Hancock County; one in Elk district, Kanawha County for a deep test; one in Laurel Hill district, Lincoln County; one in Logan district, Logan County; one in Pocatalico district, Putnam County; two in Murphy district, Ritchie County; one in Burning Springs district, Wirt County, and one in Baileyville district, Wyoming County.

CANADIAN FIELDS

Wildcatting Spreads To Far Northwest

CHATHAM.—The search for oil in Alberta has entered an entirely new area with Phillips Petroleum Co. starting exploration in the extreme northwestern foothills close to the British Columbia boundary. The territory, far to the northwest of previous Alberta foothills development, is on the Narraway River near Nose Creek, some 36 miles southwest of Grand Prairie. Phillips has two permits, one for 15,856 acres in Townships 63-64, Ranges 13-14w6, and the other for 12,000 acres in Township 65, Ranges 13-14w6. Acquisition of this acreage follows 2 years of geological work in areas along the Alaska Military Highway, in the Peace River block of northern British Columbia and in the extreme north end of the Alberta foothills belt.

Turner Valley.—In West-Central Turner Valley, Miracle 3, LSD 11, 4-19-2w5, plugged back from the Madison, and swabbing, is averaging 17 bbl. of light crude from the Home sand at 4,780 ft. with prospects of some increase when obstructions are cleared.

In Turner Valley North Extension, Foothills Oil & Gas 21, LSD 10, 4-21-3w5, is testing with a good production indicated from the Madison limestone at 8,047-8,448 ft.

Steveville.—In the Steveville-Princess field, eastern Alberta, California-Standard CPR 78-22-A, LSD 13, 22-20-12w4, finished at 3,984½ ft., started flowing 166 bbl. of 34° gravity crude, increasing to 258 bbl. with a substantial gas volume.

Conrad.—In the Conrad field, southern Alberta, Conrad-Province 31-5-A, LSD 2,

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Front view of Holan 2-ton Winch

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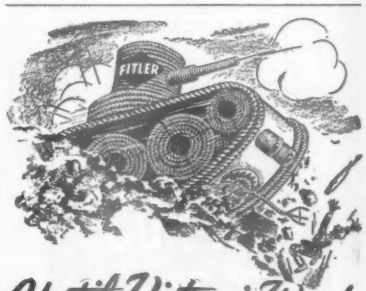

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PHILADELPHIA, PA.
Established 1794

5-6-15w4, finished at 3,019 ft., is being put on the pump.

MISSISSIPPI

Condensate Sands Cored In Lower Tuscaloosa

JACKSON.—Humble Oil & Refining Co. 1 Ball, 760 ft. south and 1,980 ft. east of NW corner of 20-2n-14e, in the Hub field of Marion County, has cored several gas-condensate sands in the lower Tuscaloosa zone. Marine Tuscaloosa was topped at 8,546 ft., and the base cut at 8,842 ft., coring being between 8,871 ft. and 9,120 ft. A drill-stem test taken at 9,105-20 ft., recovered 860 ft. of 32-gravity oil and 400 ft. of oil and gas-cut mud. Hole is being conditioned before coring ahead.

Alabama operations are being highlighted by the Carter Oil Co. 1 Alman, approximately SW NE SW 5-10n-3w. This wildcat, two miles from the Gilbertown pool, is testing the Eutaw sands and testing to determine oil-water contact before completion. A drill-stem test at 3,405-08 ft. and 3,413-16 ft. with two packers recovered 210 ft. heavy mud and oil, 180 ft. of oil-cut mud, salt water cut with oil and mud, and salt water cut with oil and gas.

MISSISSIPPI WILDCAT FAILURES

LeFlore County: Lynn Oil 1 Lundy, NE NE SW 9-17n-1e, dry, TD 5,511 ft., Massive sand 5,127 ft.

Rankin County: Carter 1 Nelson estate, SW NE NE 15-4n-5e, dry, TD 8,004 ft., Comanche 7,965 ft.

Washington County: Lee Raines 1 Aldridge, SW NE 24-16n-7w, dry, TD 4,020 ft., Midway 3,197 ft.

Yazoo County: A. W. Hutchings Drilling 1 Montgomery, NE NE SE 34-11n-1w, dry, TD 7,604 ft.

LA.-ARK.

Lake St. John Adds Three New Producers

SHREVEPORT.—The Lake St. John pool of Concordia Parish has been given three new producers, all drilled by the California Co. No. 2 Learned is producing 269 bbl. from the Massive sand and Tuscaloosa at 9,084-9,100 ft., and the 1 Scott is making 190 bbl. per day from the same pay. The 4 Brown, in 3-9n-10e, is making 75 bbl. per day from a shallower pay at 3,400-07 ft.

The Delhi pool of Richland Parish added four new oilers this week, and completed a dry hole. The four oil wells had a combined initial of 1,393 bbl. per day, and payed from the Tuscaloosa and Paluxy.

In the Arkansas fields, only two completions were made this week. Stephens pool and Smackover pool both added one oil well. New locations for the state number four, including a wildcat start for Union County.

NORTH LOUISIANA WILDCAT FAILURES

DeSoto Parish: Tom Palmer 1 Hill, 1,980 ft. north and 660 ft. east of SW cor. of SE 3-10n-13w, dry, TD 6,555 ft.

Red River Parish: George D. Stevens 1 Stephens, 2,310 ft. south and 330 ft. east of NW cor. of 27-12n-9w, dry, TD 2,005 ft.

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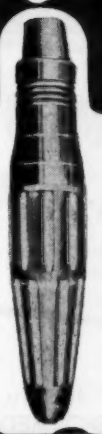

* The smooth and continuous rolling action of the hardened steel roller pins efficiently and economically "does the job" in a minimum of time and without excessive friction, vibration or hammering which may damage casing.

In diameters from 3½" to 17⅜". Write or phone for complete specifications, or prompt field service.

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Fig. 177
1000-lb. Test

Fig. 192
1600-lb. Test

Dependable in every OIL and GAS Service

We could go into exhaustive detail about the many reasons for Kennedy Valve dependability . . . heavy body and bonnet section . . . sturdy operating mechanisms with large-diameter stems, rugged discs, and fool-proof wedging action that assures tight closure and quick release . . . special provisions for ease of repacking and inspection . . . and a multitude of design refinements that provide extra value in every part.

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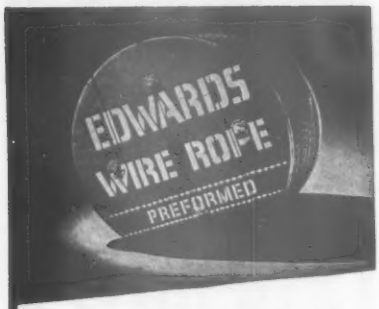

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E. H. EDWARDS COMPANY

Among the

Drilling Contractors

General Petroleums, Calgary, Alta., is below 3,621 ft. on Princess-C.P.R. 38-22-A, drilling for the California-Standard in LSD 15, 22-20-12w4 in the Steveville-Princess field, eastern Alberta.

Texas Railroad Commission will hold a hearing at the Capitol, in Austin, September 4, to consider the application of **West Central Drilling Co.** to complete dually 34 wells operated by the company in the Reddin field, Taylor County, Texas.

Midwestern Drillers, Tulsa, recently obtained contract from Columbian Carbon Co. for drilling seven wells to depths of approximately 2,750 ft. in the vicinity of Ullysses, Kans. One of the contractor's rigs is now in the area; a second rig is to be moved there later.

Trio Drilling Co. has the contract to drill the C. W. Collin 1 Hoyt-Davis, in SW NE NE 1-13n-8w, Mecosta County, Michigan.

Olson Drilling Co. and L. A. Wright have staked location for a Wilcox test northeast of Guthrie, in Logan County, Oklahoma. The well is the 1 Nance, in C SW NW 26-17n-2w. The Wilcox sand is expected around 5,800 ft.

Mid-West Drilling Co., of Regina and Kamsack, Saskatchewan, has contract to drill a test in NW¼ 23-29-32w1, in the Kamsack shallow field for Western Petroleum, Ltd., of Kamsack. Portable rotary will be used. Mid-West is also drilling a well for Northern Royalties, Ltd. in the town of Kamsack.

Teal Drilling Co., Hoisington, Kans., has been awarded drilling contract on the Derby Oil Co. 1 Brown, in C/S½ SE NE 20-8-16w, a wildcat test in eastern Rooks County, Kansas.

Fenpar Drilling Co. is contractor on the Sohio Petroleum Co. 1 Emerson B. Cheadle, in C N½ NW SE 33-16n-6w, Isabella County, Michigan.

Holm Drilling Co., Tulsa, has the contract to drill the Cinoil Ink Co. 1 Berens "B", in SE NW NW 1-14-16w, near Walker, Kans., in southeastern Ellis County, Kansas. Stanolind Oil & Gas Co. owns the northwest offset and is contributing dry-hole money to the test.

Lupher Drilling Co. has been awarded contracts to drill three tests in Isabella County, Michigan. Two of these are for Sohio Petroleum Co., and the third is for Wittmer Oil & Gas Co. The former are the 1 Laura B. Wilson, in C N½ SE NE 30-16n-6w, and the 1 Celia Bilderbeck, in C N½ NE SW 33-16n-6w, while the Wittmer test is the 2 John J. McReavy, in E½ NE SW 12-15n-4w.

Iron Drilling Co. will drill the Transwestern Oil Co. 1 Schlesner, in SW SW NW 29-15-4e, Dickinson County, Kansas. The test is located

Uniform Quality

RECTORSEAL is made under constant laboratory control, assuring the same high quality and leak-preventing properties with each and every application. The recent enlargement and modernization of the chemical laboratory permits closest and most accurate control of every production process.

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in the extreme southwestern edge of the county and is approximately 3 miles north of production in the Lost Springs pool of Marion County, Kansas.

Muskegon Development Co. will drill the Gulf Refining Co. 1 Frank Stevens, in SW NE NW 17-14n-6e, Bay County, Michigan.

Kiowa Drilling Co. tools are drilling the J. M. Huber Oil Co. and Kiowa Drilling Co. 1 Singer, in NW NW SE 5-20-17w, Pawnee County, Kansas. The test is being drilled on a farmout from Stanolind Oil & Gas Co.

Newell & Chandler, of Calgary, Alta., has contract to drill Taber-Province 45-15-A, LSD 15-9-17w4, for California Standard in the West Taber field, southern Alberta.

Stuart Godfrey is the drilling contractor on the Erick Bock 1 Nina L. Irey, in NW NW SE 22-1n-16w, Allegan County, Michigan.

Can-Tex Drilling Co. of Calgary, Alta., has the contract for Wrentham-Province 2, LSD 16, 12-6-17w4, for California Standard. The well will test a potential extension of the Conrad field in southern Alberta 7 miles west of present production. The same company will drill Conrad-Province 35-32-B for California Standard in LSD 10, 32-5-15w4, in the main Conrad field.

Kentucky Fields

(Continued from page 180)

Heirs property in Powell County, South Fork, at 800 ft., good for 1 bbl. daily. Same operator completed No. 22 on the Kate Sawyer property in Estill County, Owl Hollow, total depth of 235 ft., also good for 1 bbl., but No. 20 Kate Sawyer was dry.

KENTUCKY

OWENSBORO. — Seven oil wells and three dry holes were completed in western Kentucky during the week, the best of the oil wells being Sun Oil Co. 1 Fannie Pritchett, 1 mile south of Dixie, which made 297 bbl. the first day from Cypress sand at 2,300-09 ft. It had not been shot

WESTERN KENTUCKY WILDCAT FAILURES

Union County: Lincoln Petroleum et al 1 Smith-Proctor, 4-P-20, dry, TD 2,280 ft., Cypress 2,272 ft.
Joe Reznik 1 Garnett, 8-L-19, dry, TD 1,675 ft., McClosky 1,644 ft.
Farmer-Chenault 2 Conn, S/2 17-M-19, dry, TD 1,500 ft.

INDIANA

EVANSVILLE. — The week's crop of completions in Indiana included a 550-bbl. well, Sinclair-Wyoming Oil Co. 1 Elliott, SW NE SW 14-5s-14w, New Harmony pool, Posey County. Two other oil wells and a dry hole were completed in the state during the week.

Texas Co. 1 J. L. Larkin, NE NE SW 16-6s-14w, in Posey County, gave indications of production in three pays, Heidelberg, O'Hara and McClosky. It is 3 miles from production.

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See Composite Catalog—
Pages 3101 to 3120

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Oil Tools
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HUNTINGTON PARK, CALIF.

PERSONALS

Heads Seaboard's Gas-Utilization Department

R. E. HEITHECKER, who resigned as senior petroleum engineer at the Bureau of Mines petroleum experiment station in Bartlesville, Okla., now heads the gas-utilization department of the Mid-Continent division, Seaboard Oil Co. of Delaware, with headquarters in Dallas.

Heithecker, a native of Indiana, graduated from Purdue University in 1924 with a B.S. in mechanical engineering and entered the junior engineering training course of the Empire Companies (now Cities Service Oil Co.) in Bartlesville. He joined the Bureau of Mines as a petroleum engineer in 1926 and had various assignments in Laramie, Wyo.; Carlsbad, N. M.; Shreveport, La., and Bartlesville.

For the last 6 years of his service with the bureau Heithecker was head of the section at Bartlesville dealing with primary oil and gas production problems. He was in charge of a wide range of oil and gas engineering investigations and is the author of several Bureau of Mines publications.

Clyde W. Smith, manager of the safety department of Standard Oil Co. of Indiana, who established the first safety department in the petroleum industry when he joined the company's Whiting, Ind., refinery in 1918, has retired because of ill health.

W. E. Weidler, formerly vice president of Central Pipe Line Co., with offices in Salem, Ill., has resigned to become vice president and Midwest representative of Red Bank Oil Co., with offices in Salem and Dallas. **R. L. Young** has resigned as pipe-line superintendent for the company to enter general construction work, with offices in Centralia, Ill.

Maj. John C. Henderson, an Army Air Corps senior officer in England since September 1942 and a veteran of World War I, has been placed on inactive duty and has returned to his former position in Youngstown, Ohio, as manager of the Youngstown branch of Sinclair Refining Co. He joined Sinclair 20 years ago.

C. W. Turner, formerly geologist for Gulf Oil Corp. in Amarillo and Fort Worth, has been assigned to the Midland, Tex., office. Turner, a graduate of University of Texas, taught in Texas School of Mines before joining Gulf 3 years ago.

Charles S. Penfield, who was drilling superintendent for Shell Oil Co., Inc., at Calgary, has been transferred to the Los Angeles office as drilling superintendent. **Frederick B. Hilmer,** who was a chemist in products application for Shell Development Co. at Emeryville, Calif., has been transferred as chemical engineer to the New York office.

Martin B. Egan, a consulting geologist at Mount Carmel, Ill., is closing his office there to join Venezuelan Atlantic Refining Co. He has been assigned to Caracas.

Jack Tarner, formerly assistant professor of petroleum and gas engineering at Pennsylvania State College, has joined Phillips Petroleum Co. as a reservoir engineer at Oklahoma City.

F. T. Fendley, purchasing agent for Humble Oil & Refining Co. in Houston, has been named to head the purchasing agents' division of the Harris County War Chest's fall campaign.

I. R. Cunningham, manager of the accounting department of Creole Petroleum Corp., has been appointed comptroller. He succeeds **N. J. Beals,** who resigned to take a position in the producing department of Standard Oil Co. (New Jersey), of which Creole is an affiliate operating in Venezuela. Cunningham joined Standard Oil Co. of Venezuela, later merged with Creole, as a stenographer at Maracaibo in 1924.

Earl Noble, manager of exploration for Union Oil Co., left Buenos Aires recently for Los Angeles after spending a few weeks visiting company office in Asuncion, Paraguay.

Ing. Exequiel Perez Prins, director of refining for ANCAP, Montevideo, Uruguay, is on a 6-week trip to New York and Washington. This trip is being made in connection with the supplies of crude oil for the ANCAP refinery, and also its postwar enlargement program.

Carl Barnhart succeeds **Warren D. Anderson** as Amerada Petroleum Corp. district geologist for the Permian basin at Midland, Tex. Barnhart has been assistant district geologist for 10 years. Anderson will remain in Midland in the oil business.

W. L. Wooley has been transferred from Tulsa to Midland, Tex., as West Texas-New Mexico district geologist for Mid-Continent Petroleum Corp.

C. V. Sidwell, petroleum engineer and for the past 4 years consultant for various companies and individuals, has been named head of the production department of the University of Tulsa college of petroleum sciences and engineering. Following his graduation from University of Oklahoma Sidwell joined Cortez Oil Corp. for work in Tampico, Mexico, as a subsurface geologist. Later he went with Pan American Petroleum & Transport Co. and then, for 7 years, was division production engineer for Amerada Petroleum Corp. in Oklahoma and Kansas. After that he was general superintendent of drilling and production for British American Oil Producing Co. In 1937 Sidwell entered independent drilling and development operations, besides acting as consulting engineer. He is president of the Sidwell Engineering and the Drilling Mud companies.

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MARKET QUOTATIONS

Prices as of August 14, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78†	70–74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.625
Northeast Coast	...	9.075
California	....	6.50–7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26–70	18–55
Oklahoma (Group 3)	4.500	5.400
North Texas (f.o.b. plant)	4.125	4.950
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	*1.43
Tepetate, Louisiana	1.18
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma Kansas	Gulf Coast Texas	West Tex.*
18–18.9	$0.80	....	....	....
19–19.9	.84	....	$1.06	$0.70
20–20.9	.88	$0.85	1.08	.72
21–21.9	.92	.87	1.10	.74
22–22.9	.96	.89	1.12	.76
23–23.9	1.00	.91	1.14	.78
24–24.9	1.03	.93	1.16	.80
25–25.9	1.07	.95	1.18	.82
26–26.9	1.11	.97	1.20	.84
27–27.9	1.15	.99	1.22	.86
28–28.9	1.18	1.01	1.24	.88
29–29.9	1.20	1.03	1.26	.90
30–30.9	1.23	1.05	1.28	.92
31–31.9	....	1.07	1.30	.94
32–32.9	....	1.09	1.32	.96
33–33.9	....	1.11	1.34	.98
34–34.9	....	1.13	1.36	1.00
35–35.9	....	1.15	1.38	1.02
36–36.9	....	1.17	1.40	1.04
37–37.9	....	1.19	1.42	1.06
38–38.9	....	1.21	1.44	1.08
39–39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended August 4, 1945
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks — Gasoline	Distillate	Residual
East Coast	822	13,947	9,287	6,508
Appalachian	163	3,542	1,005	410
Ill., Ind., Ky.	807	16,593	5,210	2,681
Okla., Kan., Mo.	388	8,331	2,142	1,409
Inland Texas	223	2,700	397	988
Tex. Gulf Coast	1,230	15,684	5,537	5,341
La. Gulf Coast	277	3,895	1,854	1,245
North La., Ark.	74	2,569	742	214
Rocky Mt.	127	2,183	341	675
California	966	13,368	10,206	23,371
Total 8- 4-25	5,077	*84,812	36,721	42,842
Total 7-28-45	4,996	86,008	36,071	42,283
Total 8- 5-44	4,522	79,410	38,951	56,885

*Military 38,561. Civilian 46,251.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
August 4, 1945	215,382,000
July 28, 1945	218,507,000
August 5, 1944	222,931,000

*Excludes unrefinable California stocks.

ORBIT VALVES

SAND VS WING VALVES

The **ORBIT VENTURI TYPE VALVE** is manufactured with Stellite "J" Metal Seats which will not only withstand the abrasion of sand but is also corrosion resistant to all types of crude oil.

ORBIT VENTURI TYPE VALVE

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of other leading valves. The Orbit Valve requires no lubrication to effect a seal.

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ORBIT VALVE COMPANY

TULSA, OKLAHOMA

Rocky Mountain Area

(Continued from page 177)

Colorado-Wyoming boundary came in for considerable attention a number of years ago when federal land was acquired for exploration under prospecting permits instead of leasing and permits were held on several hundred thousand acres. After the change in the leasing law many of these were converted into leases.

Record well makes new hole.—Superior Oil Co. 1 Miller, SW SW NW 36-8s-91w, Divide Creek, Mesa County, Colorado, has cleaned out to old bottom at 10,815 ft. and is now making new hole. This well was drilled to 10,815 ft. in 1939 by Continental, Amerada and California companies without reaching the Dakota. Superior recently took over the operation jointly with Alder Oil Co. and will go to the Dakota at around 12,000 ft.

More gas in North Baxter Basin test.—Transcal Petroleum Co. 1 Union Pacific, NE SE 11-19n-104w, North Baxter Basin, Sweetwater County, Wyoming, a test to the Weber (Tensleep), cored the Sundance sand at 3,645-60 ft. and in a drillstem test open 45 minutes recovered 15 ft. of sand showing 1,000,000 cu. ft. of dry gas. Test in Dakota at 3,142-70 ft. showed for 2,660,000 cu. ft. per day, and another at 3,035-45 ft. was estimated at 10,000,000 cu. ft.

New operations.—Nine new operations, of which four are wildcats, were reported. The wildcats included Carter 1 Brindley, NE NE 12-36n-6w, North Cut Bank, Glacier County, Montana; Cities Service 1 Unit, SW SW SE 34-13n-97w, West Cherokee Ridge, Sweetwater County, Wyoming; Dale Resler 1 Naida, SE SE 27-1n-15e, Corona structure, Torrance County, New Mexico, and Richfield 1 Drouthe-Boothe, NW NW SE 4-15n-6w (unsurveyed), Ignacio Chavez grant, McKinley County, New Mexico, an 8,000-ft. test to the Pennsylvanian.

Completions.—Fourteen wells were completed of which 10 were producers with an initial production of 2,099 bbl., 1 was a gas well and 3 were dry holes. Cut Bank had three producers and the others were scattered. Five completions were wildcats, including three dry holes and two small oil and gas discoveries.

WYOMING SUCCESSFUL WILDCAT

Natrona County, Oil Mountain: New oil pool—Texas Co. 1 Clark, NE NE SW 35-33n-82w, TD 3,326 ft., tested Madison, plugged back to 2,675 ft. and tested 172 bbl. oil, 1 per cent water, from Tensleep.

WYOMING WILDCAT FAILURE

Fremont County, Bridger Creek: Connor Tank Co. 1 Unit, SW SW NW 26-41n-91w, TD 748 ft., top Tensleep 688 ft., show dead oil, dry.

MONTANA WILDCAT FAILURES

Toole County, Devon: C. Devenbaugh 1 Devenbaugh, SE NW NE 14-33n-1e, TD 1,732 ft., sulfur water, dry.

Texas Co. 3 Wier, NW SW NE 4-33n-1e, TD 1,675 ft., top Madison 1,649 ft., heavy flow of sulfur gas after acid, 1 pint oil and 15 gal. water per hour, dry.

NORTHWESTERN NEW MEXICO SUCCESSFUL WILDCAT

San Juan County, Kutz Canyon: Southern Union Prod. Co. 1 Cain, SW SW 15-28n-10w, TD 1,395 ft., top Farmington sand 1,350 ft., 2,000,000 cu. ft. gas per day.

N. Central Texas

(Continued from page 178)

Wichita County had eight field completions, while Archer, Clay, Jack and Young counties each had four. Cooke and Wichita counties each reported seven field locations and Archer and Young counties four each.

In West Central Texas Jones and Eastland counties each had two field completions. Reddin field, Taylor County, and Jones County Regular field each had two new locations.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCATS

Archer County: New oil pool—P. C. Burns 1 G. F. Parsons, Blk. 1, EL&RR Sur. A-688, 5½ mi. N and 1½ mi. E Megargel, elev. 1,154 ft., pumped 10 bbl. day, perf. 1,488-95 ft., TD 1,495 ft.

Jack County: New oil pool—Continental 1 S. F. Borden, E. S. Wilson Sur., 7 mi. SE Newport, Clay County, Simpson 6,722 ft., flowed 1,026 bbl. day through 1-in. choke on 2-in. tubing, gravity 42°, gas-oil ratio 1,553, TD 6,921 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: C. M. Burnett et al Pechacek, M. Fanning Sur. A-128, 4½ mi. E. and ½ mi. N Holliday, dry, TD 323 ft.

R. W. Darden 1-M J. H. Turbeville, Blk. 66, Jefferson CSL A-240, 5 mi. E and 1½ mi. N Anarene, dry, TD 1,195 ft.

Cooke County: Benson Bros. 1 R. M. Zipperer, Lot 24, Geo. Ivy Sur. A-516, ¾ mi. N Muenster, elev. 1,109 ft., dry, TD 1,501 ft.

Jack County: L. T. Burns 2 M. N. Garrett, BBB&C Sur. A-100, 2 mi. W and ½ mi. N Antelope, elev. 1,066 ft., dry, TD 4,891 ft.

H. H. Coffield 1 S. W. Barker, Mathew Marbin Sur. A-416, 1 mi. N Hess, elev. 1,233 ft., dry, TD 3,115 ft.

Wichita County: Akin & Dimock, James Cole Sur. A-27, 7 mi. W Clara, dry, TD 1,727 ft.

Young County: Bennett & Bennett 1 Hennig, Sec. 65, TE&L Sur., 5½ mi. W and 1½ mi. N Orth, dry, TD 1,108 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Jones County: Extension to old oil pool—R. H. Roark and L. F. Hooker 2 W. H. Wyatt est., J. H. Warfield No. 10, 2½ mi. NE Nugent elev. 1,550 ft., pumped 40 bbl. day through 2-in. tubing, perf. 1,410-24 ft. Fry, gravity 36°, TD 1,424 ft.

Permian Basin

(Continued from page 177)

WEST TEXAS WILDCAT FAILURES

Floyd County: Geo. P. Livermore 1 Alexander, Sec. 345, J. C. Cooper, 10 mi. SE Floydada, elev. 3,106 ft., San Angelo 3,390 ft., dry, TD 6,510 ft.

Kent County: Sohio 1 W. A. Mays, Sec. 44, Blk. 4, H&GN Sur., 13 mi. SW Clairmont, elev. 2,184 ft., Strawn 5,825 ft., Ellenburger 7,562 ft., dry, TD 7,768 ft.

Lamb County: Hunt Oil 1 Faust, Sec. 43, Blk. B-1, R. M. Thompson Sur., 11 mi. E. Littlefield, elev. 3,516 ft., Glorietta 4,490 ft., Tubb 5,550 ft., dry, TD 6,304 ft.

Pecos Couney: Humble 4 State National Bank of El Paso, Sec. 3, Blk. 140, T&St.L., 3 mi. E Apco-Warner pool, elev. 2,622 ft., Ellenburger 5,220 ft., dry, TD 5,492 ft.

Runnels County: Cherry & Kidd 1 Fowler, Sec. 150, ETRR Sur., elev. 1,668 ft., dry, TD 3,615 ft.

Schleicher County: George Day 1 C. C. McBurnett, Sec. 11, Blk. L, GH&H Sur., 36 mi. E Page field, elev. 2,291 ft., Strawn 4,950 ft., Ellenburger 6,050 ft., dry, TD 6,373 ft.

Scurry County: Lion Oil Refg. 1 E. C. McLaughlin, Sec. 197, Blk. 97, H&TC Sur., 10 mi. W. Snyder, San Angelo 2,415 ft., Clear Fork 2,545 ft., dry, TD 3,724 ft.

Tom Green County: Harley Sadler 1 Bob Mims, Sec. 80, Blk. 6, H&TC Sur., 3 mi. SW Funk field, elev. 2,326 ft., Clearfork 1,595 ft., dry, TD 1,830 ft.

PANHANDLE WILDCAT FAILURE

Dallam County: Shamrock Oil & Gas 1 Hester, Sec. 355, Blk. 1-T, T&NO Sur., 4 mi. SE Conley, elev. 3,774 ft., dry, TD 3,468 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Humble Oil & Refining Co. 1 Penrose, 13-22s-37e, in the Skelly-Penrose shallow pool of southeastern Lea County, recovered an hourly average of 1½ bbl. of fluid, mostly oil, at the end of 12 hours of natural testing of the Glorietta (Holt) section of the Permian lime. Casing had been gun perforated with four shots to the foot at 5,080-5,100 ft. and at 5,135-80 ft. The test swabbed fluid at the rate of 16 bbl. hourly following treatment with 2,000 gal. of acid through casing perforations at 5,200-25 ft. Seventy-five per cent of the fluid was oil, 25 per cent acid water. Swabbing continued. The well is 2 miles south of deep production in the Drinkard area.

About 6 miles north of the Caprock field, Lea County, R. Olson Oil Co. is spudding a 5,100-ft. wildcat. It is 1 State, 660 ft. from the south and east lines of 29-11s-32e. Humble has spotted a new Ordovician project to 12,000 ft. ½ mile north of the discovery well in the Dublin pool of southeastern Lea. It is 1-B Federal-Leonard, 1,980 ft. from the north line and 660 ft. from the west line of 12-26s-37e. Phillips Petroleum Co. 4 Lea-Mex, deep test in the Maljamar area of Lea County, was drilling below 13,654 ft. in shale.

Eddy County had five field locations this week and Lea County had two. Each of these counties reported two new field locations.

Southwest Texas

(Continued from page 179)

Starr, Val Verde, and Webb counties. Duval County led with six completions, with Jim Wells and Starr counties each having five completions.

WILDCAT FAILURES IN SOUTHWEST TEXAS

Atascosa County: Quintana Petroleum 1 C. Mull, J. C. Mattison Sur. 467, dry at 8,965 ft.

Duval County: Haynes B. Ownby Drilling 1 J. T. Dinn, AB&M Sur. 458, 12 miles northwest of Realton, dry at 3,511 ft.

Goliad County: Rowan & Hope 1 Grace Ryals, John Shelly Sur., 5 miles south of Blanconia, dry at 5,508 ft.

Jim Hogg County: H. M. Amsler 1 M. Garza estate, Sur. 39, 25 miles south of Hebbronville, dry at 3,017 ft.

Karnes County: Union Production 1 M. Schaefer, LPIA&M Co. Sur., Abstract 353, 6 miles west of Green, dry at 6,227 ft.

McMullen County: Santa Clara Oil 1-A Volney M. Brown et al, R. H. Brown Sur., Abstract 747, 12 miles west of Whitsett, dry at 6,503 ft.

San Patricio County: Lonnie Glasscock 2 Mrs. Louise Newman, J. W. Bullard subd., 3 miles north of Odem, dry at 7,001 ft.

Starr County: Sun Oil 1 S. Cantu et al, Porcions 39 and 40, Tract 2, 17 miles east of Rio Grande City, dry at 6,888 ft.

Val Verde County: O. H. Hammer 1 L. E. Davis, GC&SF Sur., 40 miles north of Del Rio, dry at 3,200 ft.

Webb County: Humble 1 Mary Kate Withers, Jesus Jaurez Sur. 1412, 18 miles east of Encinal, dry at 6,602 ft.

Upton County: Humble 1 Mrs. W. E. Gresham, Sec. 2, Indianola Fy. Sur., 17 mi. NE Rankin, elev. 2,707 ft., dry in basal Permian, TD 9,550 ft.

Winkler County: Richardson & Bass 1 KCS, Sec. 25, Blk. B-2, PSL Sur. 2¾ mi. S Keystone Ellenburger pool, elev. 2,944 ft., Simpson 9,500 ft., Waddell 10,310 ft.

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